LOGARITHMIC

AND OTHER

MATHEMATICAL TABLES

BY

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ASTRONOMER IN THE LICK OBSERVATORY

FIFTH EDITION

ALLYN AND BACON

Boston and Chicago

PREFACE.

THE extended calculations required by some of the applications of trigonometry are laborious even to experienced computers, and to beginners are often a fruitful source of discouragement. Experience in making calculations and familiarity with the formulas employed suggest methods of arrangement by which skilful computers shorten their work and save much of their time. The aim should always be to secure the results to the required degree of accuracy with a minimum expenditure of time and labor. So far as the mechanical part of the work is concerned, the principal factors leading to this end are the proper arrangement of the formulas employed, the use of conveniently arranged tables having the needed helps for facilitating interpolation, and the use of no more places of decimals than are necessary to secure the desired accuracy in the results.

Orderly arrangement is almost indispensable to correct and rapid computation; on this account the practice of making computations on scraps of paper without systematic arrangement should not be followed. In the beginning, an outline of the entire solution should be made by writing the symbols of the quantities to be used in a vertical column, those to be combined being placed adjacent. In the same solution, turning more than once to the same place in the tables should be avoided, by taking at one opening all the functions of a given angle that may be required, and writing them in their proper places. The tables employed should be conveniently arranged, and, in general, should have auxiliary tables of proportional parts on the margins of the pages, so that the interpolations can easily be made mentally.

The number of decimal places to be used in any calculation is governed by the character of the data given, and the degree of accuracy required in the results. When the data have great precision, and the results are required with all attainable accuracy, seven decimal places must be used, or even a larger number. But for nearly all calculations such precision is not required, and the use of logarithms to five places of decimals is sufficient, as they afford results which are generally correct to one ten-thousandth

part. In calculations where this degree of accuracy is not necessary, a still smaller number of decimal places may be used. In such cases natural numbers and the natural trigonometric functions are frequently more convenient than their logarithms.

In compiling this book for general use, the needs of computers and of students have been kept in view. The arrangements of the tables are those which have been found the most convenient by experienced computers; they are at the same time such as are best adapted to the use of students. All needed helps are given for facilitating interpolation. Auxiliary tables of proportional parts accompany the logarithmic portions of the book, but are omitted in the table of natural trigonometric functions, where differences are generally small.

Throughout the greater part of the book every tenth line is enclosed by parallel rules, and the other lines are grouped in threes. This gives the pages an open appearance, enabling one to find more readily the numbers sought, and securing in the trigonometric tables a symmetrical arrangement such that the order is the same in reading from the bottom of the page as from the top.

The auxiliaries S and T, which are always used in connection with the logarithms of numbers, are conveniently placed at the bottom of pages 2 to 21, instead of in a separate table. Their arithmetical complements, CS and CT, are to be found on pages 62 to 64, adjacent to the logarithmic trigonometric functions with which they are used.

The tables of addition and subtraction logarithms are based on those of Zech. The argument in each of these tables is obtained by subtracting the smaller logarithm from the larger. The function is always added to the larger logarithm in addition, and always subtracted from it in subtraction. On account of these uniform ways of proceeding, these tables are more convenient than the Gaussian tables.

Note to the Fifth Edition.

The changes in this edition are as follows: Some of the astronomical constants at the end of the book have been altered to bring them into agreement with the results of recent investigations. The values of log tan 10° 24′, log sin 26° 49′, and log tan 30° 13′ have been corrected. No other errors in the third and fourth editions have come to my notice.

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Mt. Hamilton, California,
March, 1907.

CONTENTS.

INTRODUCTION.

Logarithms are used in lengthy numerical calculations to diminish the labor of multiplication, division, involution and evolution, by respectively substituting for them the operations of addition, subtraction, multiplication and division.

The rules for their use are as follows:

The logarithm of a product is equal to the sum of the logarithms of its factors.

The logarithm of a quotient is equal to the logarithm of the dividend, minus the logarithm of the divisor.

The logarithm of any power of a number is equal to the logarithm of the number multiplied by the index of the power.

The logarithm of any root of a number is equal to the logarithm of the number divided by the index of the root.

Or, expressed in formulas,

$$\log A \times B = \log A + \log B, \qquad \log \frac{A}{B} = \log A - \log B,$$

$$\log A^n = n \log A, \qquad \log \sqrt[n]{A} = \frac{\log A}{n}.$$

These rules are true for all systems of logarithms. The *Common Logarithms* are the only ones used in numerical calculations and in the following pages they are always meant unless the contrary is stated.

The common logarithm of a given number is the index of that power of 10 *which is equal to the number.* Thus, 2 is the logarithm of 100, because $10^2 = 100$; this equation is usually written $\log 100 = 2$. 10 is the *base* of the system. A *system of logarithms* comprises the logarithms of all positive numbers to a given *base.*

From the definition of common logarithms it follows, that

$\log 1$	$= 0,$	$\log 0.1$	$= -1,$
$\log 10$	$= +1,$	$\log 0.01$	$= -2,$
$\log 100$	$= +2,$	$\log 0.001$	$= -3,$
$\log 1000$	$= +3,$	$\log 0.0001$	$= -4,$
etc.,		etc.,	

from which it is evident, that logarithms are, in general, not integers. Thus, the logarithm of a number between

0.01	and	0.1	is	$-2+$ a fraction,
0.1	and	1	is	$-1+$ a fraction,
1	and	10	is	$0+$ a fraction,
10	and	100	is	$1+$ a fraction,
100	and	1000	is	$2+$ a fraction.

The fractional part of a logarithm is usually expressed decimally and is so taken as to be positive. It is then called the *mantissa,* and the integral part is called the *characteristic.*

Changing the decimal point in a number is equivalent to multiplying or dividing it by an integral power of 10; consequently, the logarithms of numbers which are the same, excepting the position of the decimal point, differ by integers. Thus the logarithm of 389.4 is 2.59040, and since $38940 = 100 \times 389.4$, the first rule for the use of logarithms gives

$$\begin{aligned} \log 38940 &= \log 100 + \log 389.4 \\ &= \quad 2 \quad + 2.59040 = 4.59040. \end{aligned}$$

Similarly,

$$\begin{aligned} \log 3.8940 &= \log .01 + \log 389.4 \\ &= -2 \quad + 2.59040 = 0.59040. \end{aligned}$$

Hence,

The mantissae of the logarithms of all numbers composed of the same figures in the same order, are the same.

The value of the characteristic depends upon the position of the decimal point in the number. An inspection of the above table shows, that

The characteristic of the logarithm of a number, partly or wholly integral, is zero or positive, and one less than the number of figures in the integral portion;

The characteristic of the logarithm of a pure decimal is negative, and one more than the number of ciphers preceding the first significant figure.

Examples: The mantissae of the logarithms of 349600, 3496, 3.496, .003496 are the same, being .54357; their characteristics are $+5$, $+3$, 0 and -3, respectively. Thus, $\log .003496 = \bar{3}.54357$, the minus sign being placed over the characteristic to indicate that it only is negative.

The rule given above for determining the characteristic of the logarithm of a pure decimal is strictly correct, and so also is the manner of writing the negative characteristic. In computing, however, it is not desirable to use the characteristics in the manner indicated. It is preferable to add 10 to logarithms having negative characteristics and to allow for the increase by a proper interpretation of the results. When so increased the characteristics may, in all operations, except in some cases in the extraction of roots, be treated as if they were positive. When written in this manner, the rule for their determination is as follows:

The characteristic of the logarithm of a pure decimal is 9, *diminished by the number of ciphers preceding the first significant figure.*

Examples: The characteristics of the logarithms of .8437, .02804, .000105 and .000009207 are respectively 9, 8, 6 and 4.

The logarithmic trigonometric functions, and the logarithms of constants less than unity contained in these tables, have had their characteristics increased by 10.

In finding the logarithm of a root an apparent difficulty arises when the characteristic is negative and is not a multiple of the index of the root. The difficulty disappears by increasing the characteristic negatively by the smallest number which will make it such a multiple and by increasing the mantissa positively by the same number. Thus, the logarithm of .003392 is $\bar{3}.53046$. The logarithm of its square root is obtained by writing its logarithm in the form $-4 + 1.53046$ and dividing by 2, the index of the root. This gives $-2 + .76523$, or $\bar{2}.76523$, or 8.76523.

A better way of proceeding is to add 10 times the index of the root to the logarithm and then divide by the index of the root. Thus, in the example given, adding 20 to the logarithm of .003392 and dividing by 2, gives 8.76523, which is the logarithm of the square root. By adding 30 and dividing by 3, the logarithm of the cube root is obtained. The logarithm of the cube root of .003392 is 9.17682.

The *arithmetical complement* of a logarithm is the difference obtained by subtracting it from 0, or from 10, if it is desired to avoid negative characteristics.

It is easily obtained by subtracting each figure of the logarithm, except the last significant one, from 9; the last significant figure must be subtracted from 10. Thus, log 2763 = 3.44138, and its arithmetical complement is 6.55862. It is to be noticed, that the logarithm of the reciprocal of a number, is the arithmetical complement of the logarithm of the number; for example, log $\frac{1}{2763}$ = 6.55862.

Since the sine and cosecant, cosine and secant, tangent and cotangent are reciprocals, their logarithms are arithmetical complements. Thus, log sin 22° 18′ 24″ = 9.57928, and log cosec 22° 18′ 24″ = 0.42072; log cos 22° 18′ 24″ = 9.96622, and log sec 22° 18′ 24″ = 0.03378; log tan 22° 18′ 24″ = 9.61306, and log cot 22° 18′ 24″ = 0.38694.

A dash printed over a terminal 5 indicates that the true value is less than 5. For example the logarithm of 59903 to seven decimal places is 4.7774486; to five decimal places this is written 4.77745. If only four decimal places are required in a computation, the $\bar{5}$ is neglected. Thus, the above logarithm is written 4.7774.

When a dash is not printed over a terminal 5, and only four decimal places are required, the fourth decimal figure is increased by one and the 5 neglected. For example, the logarithm of 7671 to five decimal places is 3.88485; to four decimal places this is written 3.8849.

Table I.

Pages 2–3 contain the mantissae of the logarithms of all numbers of one, two and three figures; the characteristics are determined by the rules previously given. If the number has one or two figures, it is given in the first column, headed N, and the mantissa of its logarithm is directly opposite it in the second column, headed L. Thus, log 3 = 0.47712, log 24 = 1.38021, log .067 = 8.82607. If the number has three figures, the first two are given in the first column and the third in the horizontal row at the top or bottom of the page, and the mantissa of its logarithm is at the intersection of the line containing the first two figures and the column containing the third. Thus, log 184 = 2.26482, log 89.1 = 1.94988, log 9.37 = 0.97174.

Pages 4–21 contain the mantissae of the logarithms of numbers from 100 to 10009. The arrangement is similar to that just described. The first three figures of the number are given in the first column and the fourth in the horizontal row at the top or bottom of the page. The last three figures of the mantissae are given in the columns headed 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and the first two, at intervals, in the second column under L. When the first two are not given in any line, they are to be taken from the first line above containing them, except, when the last three are preceded by a *, in which case they are to be taken from the next line. Thus, (p. 13) log 5764 = 3.76072, log 58.35 = 1.76604, log .5889 = 9.77004.

When the number has more than four figures, its logarithm is found by *interpolation*. For small differences, it is assumed, that differences between numbers are proportional to the differences between their logarithms. For example, required the logarithm of 168.342. The number has three orders of integers, hence the characteristic is 2. Disregarding the decimal point, the number is 168342. The round numbers, having four significant figures, next smaller and next greater than this, are 168300 and 168400, and their mantissae are (p. 5) .22608 and .22634. These numbers differ by 100, their mantissae, by 26. 26, being the difference between two successive values in the table, is the *tabular difference*. 168342 is 42 greater than 168300, hence its mantissa is $\frac{42}{100}$ of 26 (= 11, to the nearest integer,) greater than that of 168300. Therefore, log 168.342 = 2.22619. Similarly, log 39.6427 = 1.59816.

To facilitate interpolation, the tenths of the *tabular differences* are given under P P, (*proportional parts*). Thus, from the proportional table for 26, (p. 5),

the proportional part for 4 = 10.4
$\frac{1}{10}$ " " " 2 = .52
Therefore, " " " 42 = 10.92,

or 11, to the nearest integer, which agrees with the value above.

By reversing these operations, the number corresponding to a given logarithm may be found. For example, find the number of which 1.47384 is the logarithm. The next smaller mantissa (p. 7) is .47378. It corresponds to the number 2977. The difference between it and the next greater mantissa, .47392, is 14, while the difference between it and the given mantissa is 6. The figures following 2977 are obtained by dividing 6 by 14, giving 43. Hence, the number is 29.7743. The interpolation is facilitated by using the proportional table for 14. In it, 5.6 is the value next smaller than the given difference 6; 4, the fifth figure of the number, corresponds to 5.6. The difference between 6 and 5.6 is .4, which becomes 4.0 by removing the decimal point one place to the right. Corresponding to 4.0, the nearest value is 3, this is the sixth figure of the number. The interpolations, where proportional parts are given, should be made mentally, the results only being written.

The logarithmic sines and tangents of small angles may be found by means of the values of S and T, given at the bottoms of the pages. The formulas for their use are as follows:

$$\log \sin = \log \text{arc} + S,$$
$$\log \tan = \log \text{arc} + T,$$

the angle being expressed in seconds of arc. The value of S or T, to be used in any case, is that which corresponds to the angle.

Example 1. Find log sin 3″.4785.

log 3.4785 = 0.54139 . p. 8.
S = 4.68557 p. 2.
log sin 3″.4785 = 5.22696.

Example 2. Find log tan 1° 14′ 17″.84 = log tan 4457″.84.

log 4457″.84 = 3.64912 p. 10.
T = 4.68564 p. 10.
log tan 1° 14′ 17″.84 = 8.33476.

Table II.

When the logarithms of two numbers are given and the logarithm of their sum or difference is required, it may be found by using the addition or subtraction table The equations at the bottoms of the pages, 24–36 inclusive, indicate the manner of using these tables. In interpolating, it is to be noticed that the function B decreases as the argument A increases; consequently, the proportional parts must be subtracted instead of added.

Example 1. Given, $\log a = 0.98519$ and $\log b = 0.64834$. Required $\log (a + b)$.

$\log a = 0.98519$
$\log b = 0.64834$
$A = \log a - \log b = 0.33685$
B = 0.16448 p. 24.
$\log (a + b) = \log a + B = 1.14967.$

In this case the tabular difference is 31, the proportional table for 31 gives 26 as the proportional part corresponding to 85, the last two figures of A; subtracting

26 from 0.16474, the value of B in the table corresponding to a value of $A = 0.33600$, gives 0.16448. This is the value of B corresponding to $A = 0.33685$.

Example 2. Given, $\log a$ and $\log b$, as in Example 1. Required $\log (a - b)$.

In this case $x = \log a - \log b$ is $> .3$, and, as above,

$$A = \log a - \log b = 0.33685$$
$$B = 0.26794 \quad \text{p. 29.}$$
$$\log (a - b) = \log a - B = 0.71725.$$

Example 3. Given, $\log a = 0.74346$ and $\log b = 0.59484$. Required $\log (a - b)$.

In this case $x = \log a - \log b$ is $< .3$, and

$$B = \log a - \log b = 0.14862$$
$$A = 0.53790 \quad \text{p. 33.}$$
$$\log (a - b) = \log a - A = 0.20556.$$

Tables III and IV.

These tables, pp. 37–106, contain the logarithms of the trigonometric functions. The headings of the pages and columns indicate what they contain. The degrees are given at the tops, and bottoms, of the pages. On pp. 37–49, the minutes and each ten seconds are given in columns at the left and right, headed ′ ″, and the odd seconds are given in a horizontal row at the top and bottom of each page. On pp. 50–106, the minutes are given in columns at the left and right, headed ′; and on pp. 50–60, each ten seconds is given in a horizontal row at the top and bottom of each page. The columns of minutes on the left read downward; the horizontal rows at the top, from left to right; these go with the degrees at the tops of the pages. The columns of minutes at the right and the horizontal rows at the bottom, read in the opposite directions, and go with the degrees at the bottoms of the pages. On pp. 62–106, the *tabular differences* of the logarithmic sines and cosines are given in the columns headed d (*difference*), and those of the logarithmic tangents and cotangents in the columns headed c d (*common difference*).

Example 1. Find $\log \sin 0° 37′ 24″.37$.

Page 44. $\log \sin 0° 37′ 24″ = 8.03659$ Tabular difference = 19.

proportional part for 3 = 5.7

$\frac{1}{10}$ " " " 7 = 1.33

$\log \sin 0° 37′ 24″.37 = 8.03666.$

The tabular difference is 19 and the proportional table for 19 (p. 45), is used to facilitate the interpolation. The tabular difference is obtained by subtracting $\log \sin 0° 37′ 24′ = 8.03659$ from $\log \sin 0° 37′ 25″ = 8.03678$. In performing this subtraction, only the final figures of the logarithms need be used. Thus, in this case, subtract 59 from 78. The interpolation should be made mentally and only the final result written.

Example 2. Find $\log \tan 0° 42′ 17″.48$.

Page 47. $\log \tan 0° 42′ 17″ = 8.08992$ Tabular difference = 17.

proportional part for .48 = 8.16

$\log \tan 0° 42′ 17″.48 = 8.09000.$

Example 3. Find $\log \cos 0° 57′ 19″$.

This is given without interpolation in the first column of page 48, the first figures being given at the top of the column. The value is 9.99994.

Example 4. Find $\log \cos 89° 43′ 26″.4$.

Page 40. $\log \cos 89° 43′ 26″ = 7.68296$ Tabular difference = 44.

proportional part for 4 = 17.6

$\log \cos 89° 43′ 26″.4 = 7.68278.$

The proportional part is subtracted, because the cosine, here, decreases as the angle increases.

Example 5. Find log sin 3° 27′ 44″.6.

Page 54. log sin 3° 27′ 40″ = 8.78083 Tabular difference = 35.

proportional part for 4 = 14.0

$\frac{1}{10}$ " " " 6 = 2.1

log sin 3° 27′ 44″.6 = 8.78099.

Also from pages 54 and 55,

log cos 3° 27′ 44″.6 = 9.99920.

log tan 3° 27′ 44″.6 = 8.78178.

Example 6. Find log tan 8° 33′ 17″.4.

Page 70. log tan 8° 33′ 00″ = 9.17708 Tabular difference = 86

proportional part for 10 = 14.3

" " " 7 = 10.0

$\frac{1}{10}$ " " " 4 = .57

log tan 8° 33′ 17″.4 = 9.17733.

Example 7. Find log cot 56° 43′ 24″.7.

Page 95. log cot 56° 43′ 00″ = 9.81721 Tabular difference = 28.

proportional part for 20 = 9.3

" " " 4 = 1.9

$\frac{1}{10}$ " " " 7 = .33

log cot 56° 43′ 24″.7 = 9.81709.

When the logarithm of a trigonometric function is given, the angle may be found by reversing the above operations.

Example 8. Given, log tan x = 9.87258. Find x.

In the column of logarithmic tangents on page 98, we find log tan 36° 42′ = 9.87238, with the tabular difference 26. The difference between this logarithm and the given one is 20. The proportional table for 26 gives

proportional part for 40 = 17.3

" " " 6 = 2.6

$\frac{1}{10}$ " " " 2 = .09

consequently " " " 46.2 = 19.99, or very nearly 20.

Hence the number of seconds is 46.2, and the required angle is 36° 42′ 46″.2.

When a very small angle is to be found by means of its logarithmic sine or tangent, and accuracy is desired, the arithmetical complement of S or T, pp. 2-21, should be used. These are given in the columns headed C S and C T, pp. 62-64. The formulas for their use are as follows:

$$\log \text{arc} = \log \sin + \text{C S},$$
$$\log \text{arc} = \log \tan + \text{C T},$$

the angle being expressed in seconds of arc. The value of C S or C T to be used in any case, is that which corresponds to the angle.

Example 9. Given, log sin x = 6.82973. Find x.

The value of x, (see p. 62), lies between 0° 2′ and 0° 3′, or between 120″ and 180″, and, corresponding to this,

C S = 5.31443

log sin x = 6.82973

log arc = 2.14416.

The number corresponding to the logarithm 2.14416 is, (p. 4), 139.368. Therefore, x = 139″.368 = 0° 2′ 19″.368.

It is sometimes required to find the logarithm of one trigonometric function from that of another, without requiring the angle. To facilitate this, special proportional tables, headed with the tabular differences of both functions, are given, (pp. 71–106), wherever the space admits it.

Example 10. Given, $\log \tan x = 9.67644$. Required $\log \cos x$.

The difference between the given logarithm and that given in the table, 9.67622, (see p. 87, opposite 25° 23′), is 22. The tabular differences of the two logarithmic functions at this place are 32 and 6. In the proportional table for $\frac{6}{32}$, 22 corresponds to 4; this, subtracted from the tabular logarithmic cosine 9.95591, gives the required $\log \cos x = 9.95587$.

In the examples already given, the angles have all been less than 90°. The logarithms of trigonometric functions of angles greater than 90° may be obtained by remembering the relations given in the following table:

Angle	Sine	Cosine	Tangent	Cotangent
x	$+\sin x$	$+\cos x$	$+\tan x$	$+\cot x$
$90° + x$	$+\cos x$	$-\sin x$	$-\cot x$	$-\tan x$
$180° + x$	$-\sin x$	$-\cos x$	$+\tan x$	$+\cot x$
$270° + x$	$-\cos x$	$+\sin x$	$-\cot x$	$-\tan x$

For angles greater than 90°, the degrees are given at the tops and bottoms of the pages in smaller type. Where these have been obtained from the acute angle on the same page, by adding 90° or 270°, they are preceded by a *. This indicates that the co-function is to be taken. Otherwise, the direct function is to be taken. The algebraic signs of the functions, as indicated by the above table, must be attended to.

Example 11. Find $\log \sin 112° 15′ 17″$.

Page 84. $\log \sin 112° 15′ 00″ = 9.96640$ Tabular difference = 6.

proportional part for $17″ =$ 2, nearly,

$\log \sin 112° 15′ 17″ = 9.96638$.

From the same page, $\log \tan 202° 28′ 34″ = 9.61671$, $\log \cos 202° 28′ 34″ = 9.96569_n$, $\log \cot 292° 18′ 37″ = 9.61314_n$.

In the last two examples the $_n$ following the logarithm indicates that the trigonometric function is negative. This is the usual way of indicating that the number corresponding to a logarithm is negative.

Table V.

Pages 108–130 contain the natural trigonometric functions for each minute. The arrangement is the same as that of the logarithms of the trigonometric functions, pp. 62–106, except that differences and proportional parts are not given.

Table VI, Etc.

Pages 131–139 contain the squares, cubes, square roots and cube roots of numbers from 1 to 1020. The arrangement of this table, and also of the ones which follow it, will be understood by inspecting them.

I

TABLE OF THE COMMON

LOGARITHMS OF NUMBERS

WITH THE AUXILIARIES S AND T.

N	L 0	1	2	3	4	5	6	7	8	9
0	— ∞	00 000	30 103	47 712	60 206	69 897	77 815	84 510	90 309	95 424
1	00 000	04 139	07 918	11 394	14 613	17 609	20 412	23 045	25 527	27 875
2	30 103	32 222	34 242	36 173	38 021	39 794	41 497	43 136	44 716	46 240
3	47 712	49 136	50 515	51 851	53 148	54 407	55 630	56 820	57 978	59 106
4	60 206	61 278	62 325	63 347	64 345	65 321	66 276	67 210	68 124	69 020
5	69 897	70 757	71 600	72 428	73 239	74 036	74 819	75 587	76 343	77 085
6	77 815	78 533	79 239	79 934	80 618	81 291	81 954	82 607	83 251	83 885
7	84 510	85 126	85 733	86 332	86 923	87 506	88 081	88 649	89 209	89 763
8	90 309	90 849	91 381	91 908	92 428	92 942	93 450	93 952	94 448	94 939
9	95 424	95 904	96 379	96 848	97 313	97 772	98 227	98 677	99 123	99 564
10	00 000	00 432	00 860	01 284	01 703	02 119	02 531	02 938	03 342	03 743
11	04 139	04 532	04 922	05 308	05 690	06 070	06 446	06 819	07 188	07 555
12	07 918	08 279	08 636	08 991	09 342	09 691	10 037	10 380	10 721	11 059
13	11 394	11 727	12 057	12 385	12 710	13 033	13 354	13 672	13 988	14 301
14	14 613	14 922	15 229	15 534	15 836	16 137	16 435	16 732	17 026	17 319
15	17 609	17 898	18 184	18 469	18 752	19 033	19 312	19 590	19 866	20 140
16	20 412	20 683	20 952	21 219	21 484	21 748	22 011	22 272	22 531	22 789
17	23 045	23 300	23 553	23 805	24 055	24 304	24 551	24 797	25 042	25 285
18	25 527	25 768	26 007	26 245	26 482	26 717	26 951	27 184	27 416	27 646
19	27 875	28 103	28 330	28 556	28 780	29 003	29 226	29 447	29 667	29 885
20	30 103	30 320	30 535	30 750	30 963	31 175	31 387	31 597	31 806	32 015
21	32 222	32 428	32 634	32 838	33 041	33 244	33 445	33 646	33 846	34 044
22	34 242	34 439	34 635	34 830	35 025	35 218	35 411	35 603	35 793	35 984
23	36 173	36 361	36 549	36 736	36 922	37 107	37 291	37 475	37 658	37 840
24	38 021	38 202	38 382	38 561	38 739	38 917	39 094	39 270	39 445	39 620
25	39 794	39 967	40 140	40 312	40 483	40 654	40 824	40 993	41 162	41 330
26	41 497	41 664	41 830	41 996	42 160	42 325	42 488	42 651	42 813	42 975
27	43 136	43 297	43 457	43 616	43 775	43 933	44 091	44 248	44 404	44 560
28	44 716	44 871	45 025	45 179	45 332	45 484	45 637	45 788	45 939	46 090
29	46 240	46 389	46 538	46 687	46 835	46 982	47 129	47 276	47 422	47 567
30	47 712	47 857	48 001	48 144	48 287	48 430	48 572	48 714	48 855	48 996
31	49 136	49 276	49 415	49 554	49 693	49 831	49 969	50 106	50 243	50 379
32	50 515	50 651	50 786	50 920	51 055	51 188	51 322	51 455	51 587	51 720
33	51 851	51 983	52 114	52 244	52 375	52 504	52 634	52 763	52 892	53 020
34	53 148	53 275	53 403	53 529	53 656	53 782	53 908	54 033	54 158	54 283
35	54 407	54 531	54 654	54 777	54 900	55 023	55 145	55 267	55 388	55 509
36	55 630	55 751	55 871	55 991	56 110	56 229	56 348	56 467	56 585	56 703
37	56 820	56 937	57 054	57 171	57 287	57 403	57 519	57 634	57 749	57 864
38	57 978	58 092	58 206	58 320	58 433	58 546	58 659	58 771	58 883	58 995
39	59 106	59 218	59 329	59 439	59 550	59 660	59 770	59 879	59 988	60 097
40	60 206	60 314	60 423	60 531	60 638	60 746	60 853	60 959	61 066	61 172
41	61 278	61 384	61 490	61 595	61 700	61 805	61 909	62 014	62 118	62 221
42	62 325	62 428	62 531	62 634	62 737	62 839	62 941	63 043	63 144	63 246
43	63 347	63 448	63 548	63 649	63 749	63 849	63 949	64 048	64 147	64 246
44	64 345	64 444	64 542	64 640	64 738	64 836	64 933	65 031	65 128	65 225
45	65 321	65 418	65 514	65 610	65 706	65 801	65 896	65 992	66 087	66 181
46	66 276	66 370	66 464	66 558	66 652	66 745	66 839	66 932	67 025	67 117
47	67 210	67 302	67 394	67 486	67 578	67 669	67 761	67 852	67 943	68 034
48	68 124	68 215	68 305	68 395	68 485	68 574	68 664	68 753	68 842	68 931
49	69 020	69 108	69 197	69 285	69 373	69 461	69 548	69 636	69 723	69 810
50	69 897	69 984	70 070	70 157	70 243	70 329	70 415	70 501	70 586	70 672

N	L 0	1	2	3	4	5	6	7	8	9
60″	= 0° 1′ S		4.68 557 T		4.68 557	300″	= 0° 5′ S	4.68 557 T		4.68 558
120	= 0 2		4.68 557		4.68 557	360	= 0 6	4.68 557		4.68 558
180	= 0 3		4.68 557		4.68 557	420	= 0 7	4.68 557		4.68 558
240	= 0 4		4.68 557		4.68 558	480	= 0 8	4.68 557		4.68 558

50—100

N	L 0	1	2	3	4	5	6	7	8	9
50	69 897	69 984	70 070	70 157	70 243	70 329	70 415	70 501	70 586	70 672
51	70 757	70 842	70 927	71 012	71 096	71 181	71 26$\frac{5}{}$	71 349	71 433	71 517
52	71 600	71 684	71 767	71 850	71 933	72 016	72 099	72 181	72 263	72 346
53	72 428	72 509	72 591	72 673	72 754	72 835	72 916	72 997	73 078	73 159
54	73 239	73 320	73 400	73 480	73 560	73 640	73 719	73 799	73 878	73 957
55	74 036	74 115	74 194	74 273	74 351	74 429	74 507	74 586	74 663	74 741
56	74 819	74 896	74 974	75 051	75 128	75 20$\frac{5}{}$	75 282	75 358	75 43$\frac{5}{}$	75 511
57	75 587	75 664	75 740	75 815	75 891	75 967	76 042	76 118	76 193	76 268
58	76 343	76 418	76 492	76 567	76 641	76 716	76 790	76 864	76 938	77 012
59	77 085	77 159	77 232	77 305	77 379	77 452	77 52$\frac{5}{}$	77 597	77 670	77 743
60	77 815	77 887	77 960	78 032	78 104	78 176	78 247	78 319	78 390	78 462
61	78 533	78 604	78 675	78 746	78 817	78 888	78 958	79 029	79 099	79 169
62	79 239	79 309	79 379	79 449	79 518	79 588	79 657	79 727	79 796	79 865
63	79 934	80 003	80 072	80 140	80 209	80 277	80 346	80 414	80 482	80 550
64	80 618	80 686	80 754	80 821	80 889	80 956	81 023	81 090	81 158	81 224
65	81 291	81 358	81 42$\frac{5}{}$	81 491	81 558	81 624	81 690	81 757	81 823	81 889
66	81 954	82 020	82 086	82 151	82 217	82 282	82 347	82 413	82 478	82 543
67	82 607	82 672	82 737	82 802	82 866	82 930	82 99$\frac{5}{}$	83 059	83 123	83 187
68	83 251	83 31$\frac{5}{}$	83 378	83 442	83 506	83 569	83 632	83 696	83 759	83 822
69	83 88$\frac{5}{}$	83 948	84 011	84 073	84 136	84 198	84 261	84 323	84 386	84 448
70	84 510	84 572	84 634	84 696	84 757	84 819	84 880	84 942	85 003	85 06$\frac{5}{}$
71	85 126	85 187	85 248	85 309	85 370	85 431	85 491	85 552	85 612	85 673
72	85 733	85 794	85 854	85 914	85 974	86 034	86 094	86 153	86 213	86 273
73	86 332	86 392	86 451	86 510	86 570	86 629	86 688	86 747	86 806	86 864
74	86 923	86 982	87 040	87 099	87 157	87 216	87 274	87 332	87 390	87 448
75	87 506	87 564	87 622	87 679	87 737	87 79$\frac{5}{}$	87 852	87 910	87 967	88 024
76	88 081	88 138	88 195	88 252	88 309	88 366	88 423	88 480	88 536	88 593
77	88 649	88 705	88 762	88 818	88 874	88 930	88 986	89 042	89 098	89 154
78	89 209	89 265	89 321	89 376	89 432	89 487	89 542	89 597	89 653	89 708
79	89 763	89 818	89 873	89 927	89 982	90 037	90 091	90 146	90 200	90 25$\frac{5}{}$
80	90 309	90 363	90 417	90 472	90 526	90 580	90 634	90 687	90 741	90 79$\frac{5}{}$
81	90 849	90 902	90 956	91 009	91 062	91 116	91 169	91 222	91 275	91 328
82	91 381	91 434	91 487	91 540	91 593	91 645	91 698	91 751	91 803	91 855
83	91 908	91 960	92 012	92 06$\frac{5}{}$	92 117	92 169	92 221	92 273	92 324	92 376
84	92 428	92 480	92 531	92 583	92 634	92 686	92 737	92 788	92 840	92 891
85	92 942	92 993	93 044	93 09$\frac{5}{}$	93 146	93 197	93 247	93 298	93 349	93 399
86	93 45$\frac{0}{}$	93 500	93 551	93 601	93 651	93 702	93 752	93 802	93 852	93 902
87	93 952	94 002	94 052	94 101	94 151	94 201	94 250	94 300	94 349	94 399
88	94 448	94 498	94 547	94 596	94 645	94 694	94 743	94 792	94 841	94 890
89	94 939	94 988	95 036	95 085	95 134	95 182	95 231	95 279	95 328	95 376
90	95 424	95 472	95 521	95 569	95 617	95 66$\frac{5}{}$	95 713	95 761	95 809	95 856
91	95 904	95 952	95 999	96 047	96 09$\frac{5}{}$	96 142	96 190	96 237	96 284	96 332
92	96 379	96 426	96 473	96 520	96 567	96 614	96 661	96 708	96 755	96 802
93	96 848	96 89$\frac{5}{}$	96 942	96 988	97 03$\frac{5}{}$	97 081	97 128	97 174	97 220	97 267
94	97 313	97 359	97 405	97 451	97 497	97 543	97 589	97 63$\frac{5}{}$	97 681	97 727
95	97 772	97 818	97 864	97 909	97 95$\frac{5}{}$	98 000	98 046	98 091	98 137	98 182
96	98 227	98 272	98 318	98 363	98 408	98 453	98 498	98 543	98 588	98 632
97	98 677	98 722	98 767	98 811	98 856	98 900	98 94$\frac{5}{}$	98 989	99 034	99 078
98	99 123	99 167	99 211	99 255	99 300	99 344	99 388	99 432	99 476	99 520
99	99 564	99 607	99 651	99 69$\frac{5}{}$	99 739	99 782	99 826	99 870	99 913	99 957
100	00 000	00 043	00 087	00 130	00 173	00 217	00 260	00 303	00 346	00 389

N	L 0	1	2	3	4	5	6	7	8	9
540″	= 0° 9′	S	4.68 557	T	4.68 558	780″	= 0° 13′	S	4.68 557	T 4.68 558
600	= 0 10		4.68 557		4.68 558	840	= 0 14		4.68 557	4.68 558
660	= 0 11		4.68 557		4.68 558	900	= 0 15		4.68 557	4.68 558
720	= 0 12		4.68 557		4.68 558	960	= 0 16		4.68 557	4.68 558

100—150

N	L 0	1	2	3	4	5	6	7	8	9
100	00 000	043	087	130	173	217	260	303	346	389
101	432	475	518	561	604	647	689	732	775	817
102	860	903	945	988	*030	*072	*115	*157	*199	*242
103	01 284	326	368	410	452	494	536	578	620	662
104	703	745	787	828	870	912	953	995	*036	*078
105	02 119	160	202	243	284	325	366	407	449	490
106	531	572	612	653	694	735	776	816	857	898
107	938	979	*019	*060	*100	*141	*181	*222	*262	*302
108	03 342	383	423	463	503	543	583	623	663	703
109	743	782	822	862	902	941	981	*021	*060	*100
110	04 139	179	218	258	297	336	376	415	454	493
111	532	571	610	650	689	727	766	805	844	883
112	922	961	999	*038	*077	*115	*154	*192	*231	*269
113	05 308	346	385	423	461	500	538	576	614	652
114	690	729	767	805	843	881	918	956	994	*032
115	06 070	108	145	183	221	258	296	333	371	408
116	446	483	521	558	595	633	670	707	744	781
117	819	856	893	930	967	*004	*041	*078	*115	*151
118	07 188	225	262	298	335	372	408	445	482	518
119	555	591	628	664	700	737	773	809	846	882
120	918	954	990	*027	*063	*099	*135	*171	*207	*243
121	08 279	314	350	386	422	458	493	529	565	600
122	636	672	707	743	778	814	849	884	920	955
123	991	*026	*061	*096	*132	*167	*202	*237	*272	*307
124	09 342	377	412	447	482	517	552	587	621	656
125	691	726	760	795	830	864	899	934	968	*003
126	10 037	072	106	140	175	209	243	278	312	346
127	380	415	449	483	517	551	585	619	653	687
128	721	755	789	823	857	890	924	958	992	*025
129	11 059	093	126	160	193	227	261	294	327	361
130	394	428	461	494	528	561	594	628	661	694
131	727	760	793	826	860	893	926	959	992	*024
132	12 057	090	123	156	189	222	254	287	320	352
133	385	418	450	483	516	548	581	613	646	678
134	710	743	775	808	840	872	905	937	969	*001
135	13 033	066	098	130	162	194	226	258	290	322
136	354	386	418	450	481	513	545	577	609	640
137	672	704	735	767	799	830	862	893	925	956
138	988	*019	*051	*082	*114	*145	*176	*208	*239	*270
139	14 301	333	364	395	426	457	489	520	551	582
140	613	644	675	706	737	768	799	829	860	891
141	922	953	983	*014	*045	*076	*106	*137	*168	*198
142	15 229	259	290	320	351	381	412	442	473	503
143	534	564	594	625	655	685	715	746	776	806
144	836	866	897	927	957	987	*017	*047	*077	*107
145	16 137	167	197	227	256	286	316	346	376	406
146	435	465	495	524	554	584	613	643	673	702
147	732	761	791	820	850	879	909	938	967	997
148	17 026	056	085	114	143	173	202	231	260	289
149	319	348	377	406	435	464	493	522	551	580
150	17 609	638	667	696	725	754	782	811	840	869

N	L 0	1	2	3	4	5	6	7	8	9

P P			
	44	43	42
1	4.4	4.3	4.2
2	8.8	8.6	8.4
3	13.2	12.9	12.6
4	17.6	17.2	16.8
5	22.0	21.5	21.0
6	26.4	25.8	25.2
7	30.8	30.1	29.4
8	35.2	34.4	33.6
9	39.6	38.7	37.8
	41	40	39
1	4.1	4.0	3.9
2	8.2	8.0	7.8
3	12.3	12.0	11.7
4	16.4	16.0	15.6
5	20.5	20.0	19.5
6	24.6	24.0	23.4
7	28.7	28.0	27.3
8	32.8	32.0	31.2
9	36.9	36.0	35.1
	38	37	36
1	3.8	3.7	3.6
2	7.6	7.4	7.2
3	11.4	11.1	10.8
4	15.2	14.8	14.4
5	19.0	18.5	18.0
6	22.8	22.2	21.6
7	26.6	25.9	25.2
8	30.4	29.6	28.8
9	34.2	33.3	32.4
	35	34	33
1	3.5	3.4	3.3
2	7.0	6.8	6.6
3	10.5	10.2	9.9
4	14.0	13.6	13.2
5	17.5	17.0	16.5
6	21.0	20.4	19.8
7	24.5	23.8	23.1
8	28.0	27.2	26.4
9	31.5	30.6	29.7
	32	31	30
1	3.2	3.1	3.0
2	6.4	6.2	6.0
3	9.6	9.3	9.0
4	12.8	12.4	12.0
5	16.0	15.5	15.0
6	19.2	18.6	18.0
7	22.4	21.7	21.0
8	25.6	24.8	24.0
9	28.8	27.9	27.0

P P

960″	=0° 16′	S	4.68 557	T	4.68 558
1020	=0 17		4.68 557		4.68 558
1080	=0 18		4.68 557		4.68 558
1140	=0 19		4.68 557		4.68 558
1200	=0 20		4.68 557		4.68 558
1260″	=0° 21′	S	4.68 557	T	4.68 558
1320	=0 22		4.68 557		4.68 558
1380	=0 23		4.68 557		4.68 558
1440	=0 24		4.68 557		4.68 558
1500	=0 25		4.68 557		4.68 558

150—200

N	L 0	1	2	3	4	5	6	7	8	9
150	17 609	638	667	696	725	754	782	811	840	869
151	898	926	955	984	*013	*041	*070	*099	*127	*156
152	18 184	213	241	270	298	327	355	384	412	441
153	469	498	526	554	583	611	639	667	696	724
154	752	780	808	837	865	893	921	949	977	*005
155	19 033	061	089	117	145	173	201	229	257	285
156	312	340	368	396	424	451	479	507	535	562
157	590	618	645	673	700	728	756	783	811	838
158	866	893	921	948	976	*003	*030	*058	*085	*112
159	20 140	167	194	222	249	276	303	330	358	385
160	412	439	466	493	520	548	575	602	629	656
161	683	710	737	763	790	817	844	871	898	925
162	952	978	*005	*032	*059	*085	*112	*139	*165	*192
163	21 219	245	272	299	325	352	378	405	431	458
164	484	511	537	564	590	617	643	669	696	722
165	748	775	801	827	854	880	906	932	958	985
166	22 011	037	063	089	115	141	167	194	220	246
167	272	298	324	350	376	401	427	453	479	505
168	531	557	583	608	634	660	686	712	737	763
169	789	814	840	866	891	917	943	968	994	*019
170	23 045	070	096	121	147	172	198	223	249	274
171	300	325	350	376	401	426	452	477	502	528
172	553	578	603	629	654	679	704	729	754	779
173	805	830	855	880	905	930	955	980	*005	*030
174	24 055	080	105	130	155	180	204	229	254	279
175	304	329	353	378	403	428	452	477	502	527
176	551	576	601	625	650	674	699	724	748	773
177	797	822	846	871	895	920	944	969	993	*018
178	25 042	066	091	115	139	164	188	212	237	261
179	285	310	334	358	382	406	431	455	479	503
180	527	551	575	600	624	648	672	696	720	744
181	768	792	816	840	864	888	912	935	959	983
182	26 007	031	055	079	102	126	150	174	198	221
183	245	269	293	316	340	364	387	411	435	458
184	482	505	529	553	576	600	623	647	670	694
185	717	741	764	788	811	834	858	881	905	928
186	951	975	998	*021	*045	*068	*091	*114	*138	*161
187	27 184	207	231	254	277	300	323	346	370	393
188	416	439	462	485	508	531	554	577	600	623
189	646	669	692	715	738	761	784	807	830	852
190	875	898	921	944	967	989	*012	*035	*058	*081
191	28 103	126	149	171	194	217	240	262	285	307
192	330	353	375	398	421	443	466	488	511	533
193	556	578	601	623	646	668	691	713	735	758
194	780	803	825	847	870	892	914	937	959	981
195	29 003	026	048	070	092	115	137	159	181	203
196	226	248	270	292	314	336	358	380	403	425
197	447	469	491	513	535	557	579	601	623	645
198	667	688	710	732	754	776	798	820	842	863
199	885	907	929	951	973	994	*016	*038	*060	*081
200	30 103	125	146	168	190	211	233	255	276	298

N	L 0	1	2	3	4	5	6	7	8	9

P P

	29	28
1	2.9	2.8
2	5.8	5.6
3	8.7	8.4
4	11.6	11.2
5	14.5	14.0
6	17.4	16.8
7	20.3	19.6
8	23.2	22.4
9	26.1	25.2

	27	26
1	2.7	2.6
2	5.4	5.2
3	8.1	7.8
4	10.8	10.4
5	13.5	13.0
6	16.2	15.6
7	18.9	18.2
8	21.6	20.8
9	24.3	23.4

	25
1	2.5
2	5.0
3	7.5
4	10.0
5	12.5
6	15.0
7	17.5
8	20.0
9	22.5

	24	23
1	2.4	2.3
2	4.8	4.6
3	7.2	6.9
4	9.6	9.2
5	12.0	11.5
6	14.4	13.8
7	16.8	16.1
8	19.2	18.4
9	21.6	20.7

	22	21
1	2.2	2.1
2	4.4	4.2
3	6.6	6.3
4	8.8	8.4
5	11.0	10.5
6	13.2	12.6
7	15.4	14.7
8	17.6	16.8
9	19.8	18.9

P P

1500″	=0° 25′	S	4.68 557	T	4.68 558
1560	=0 26		4.68 557		4.68 558
1620	=0 27		4.68 557		4.68 558
1680	=0 28		4.68 557		4.68 558
1740	=0 29		4.68 557		4.68 559
1800″	=0° 30′	S	4.68 557	T	4.68 559
1860	=0 31		4.68 557		4.68 559
1920	=0 32		4.68 557		4.68 559
1980	=0 33		4.68 557		4.68 559
2040	=0 34		4.68 557		4.68 559

N	L 0	1	2	3	4	5	6	7	8	9
200	30 103	125	146	168	190	211	233	255	276	298
201	320	341	363	384	406	428	449	471	492	514
202	535	557	578	600	621	643	664	685	707	728
203	750	771	792	814	835	856	878	899	920	942
204	963	984	*006	*027	*048	*069	*091	*112	*133	*154
205	31 175	197	218	239	260	281	302	323	345	366
206	387	408	429	450	471	492	513	534	555	576
207	597	618	639	660	681	702	723	744	765	785
208	806	827	848	869	890	911	931	952	973	994
209	32 015	035	056	077	098	118	139	160	181	201
210	222	243	263	284	305	325	346	366	387	408
211	428	449	469	490	510	531	552	572	593	613
212	634	654	675	695	715	736	756	777	797	818
213	838	858	879	899	919	940	960	980	*001	*021
214	33 041	062	082	102	122	143	163	183	203	224
215	244	264	284	304	325	345	365	385	405	425
216	445	465	486	506	526	546	566	586	606	626
217	646	666	686	706	726	746	766	786	806	826
218	846	866	885	905	925	945	965	985	*005	*025
219	34 044	064	084	104	124	143	163	183	203	223
220	242	262	282	301	321	341	361	380	400	420
221	439	459	479	498	518	537	557	577	596	616
222	635	655	674	694	713	733	753	772	792	811
223	830	850	869	889	908	928	947	967	986	*005
224	35 025	044	064	083	102	122	141	160	180	199
225	218	238	257	276	295	315	334	353	372	392
226	411	430	449	468	488	507	526	545	564	583
227	603	622	641	660	679	698	717	736	755	774
228	793	813	832	851	870	889	908	927	946	965
229	984	*003	*021	*040	*059	*078	*097	*116	*135	*154
230	36 173	192	211	229	248	267	286	305	324	342
231	361	380	399	418	436	455	474	493	511	530
232	549	568	586	605	624	642	661	680	698	717
233	736	754	773	791	810	829	847	866	884	903
234	922	940	959	977	996	*014	*033	*051	*070	*088
235	37 107	125	144	162	181	199	218	236	254	273
236	291	310	328	346	365	383	401	420	438	457
237	475	493	511	530	548	566	585	603	621	639
238	658	676	694	712	731	749	767	785	803	822
239	840	858	876	894	912	931	949	967	985	*003
240	38 021	039	057	075	093	112	130	148	166	184
241	202	220	238	256	274	292	310	328	346	364
242	382	399	417	435	453	471	489	507	525	543
243	561	578	596	614	632	650	668	686	703	721
244	739	757	775	792	810	828	846	863	881	899
245	917	934	952	970	987	*005	*023	*041	*058	*076
246	39 094	111	129	146	164	182	199	217	235	252
247	270	287	305	322	340	358	375	393	410	428
248	445	463	480	498	515	533	550	568	585	602
249	620	637	655	672	690	707	724	742	759	777
250	794	811	829	846	863	881	898	915	933	950
N	L 0	1	2	3	4	5	6	7	8	9

P P		
	22	21
1	2.2	2.1
2	4.4	4.2
3	6.6	6.3
4	8.8	8.4
5	11.0	10.5
6	13.2	12.6
7	15.4	14.7
8	17.6	16.8
9	19.8	18.9

P P	
	20
1	2.0
2	4.0
3	6.0
4	8.0
5	10.0
6	12.0
7	14.0
8	16.0
9	18.0

P P	
	19
1	1.9
2	3.8
3	5.7
4	7.6
5	9.5
6	11.4
7	13.3
8	15.2
9	17.1

P P	
	18
1	1.8
2	3.6
3	5.4
4	7.2
5	9.0
6	10.8
7	12.6
8	14.4
9	16.2

P P	
	17
1	1.7
2	3.4
3	5.1
4	6.8
5	8.5
6	10.2
7	11.9
8	13.6
9	15.3

1980″	=0° 33′	S	4.68 557	T	4.68 559	2280″	=0° 38′	S	4.68 557	T	4.68 559
2040	=0 34		4.68 557		4.68 559	2340	=0 39		4.68 557		4.68 559
2100	=0 35		4.68 557		4.68 559	2400	=0 40		4.68 557		4.68 559
2160	=0 36		4.68 557		4.68 559	2460	=0 41		4.68 556		4.68 560
2220	=0 37		4.68 557		4.68 559	2520	=0 42		4.68 556		4.68 560

250—300

N	L 0	1	2	3	4	5	6	7	8	9	P	P
250	39 794	811	829	846	863	881	898	915	933	950		
												18
251	967	985	*002	*019	*037	*054	*071	*088	*106	*123		
252	40 140	157	175	192	209	226	243	261	278	295	1	1.8
253	312	329	346	364	381	398	415	432	449	466	2	3.6
254	483	500	518	535	552	569	586	603	620	637	3	5.4
255	654	671	688	705	722	739	756	773	790	807	4	7.2
256	824	841	858	875	892	909	926	943	960	976	5	9.0
257	993	*010	*027	*044	*061	*078	*095	*111	*128	*145	6	10.8
258	41 162	179	196	212	229	246	263	280	296	313	7	12.6
259	330	347	363	380	397	414	430	447	464	481	8	14.4
											9	16.2
260	497	514	531	547	564	581	597	614	631	647		
												17
261	664	681	697	714	731	747	764	780	797	814	1	1.7
262	830	847	863	880	896	913	929	946	963	979	2	3.4
263	996	*012	*029	*045	*062	*078	*095	*111	*127	*144	3	5.1
264	42 160	177	193	210	226	243	259	275	292	308	4	6.8
265	325	341	357	374	390	406	423	439	455	472	5	8.5
266	488	504	521	537	553	570	586	602	619	635	6	10.2
267	651	667	684	700	716	732	749	765	781	797	7	11.9
268	813	830	846	862	878	894	911	927	943	959	8	13.6
269	975	991	*008	*024	*040	*056	*072	*088	*104	*120	9	15.3
270	43 136	152	169	185	201	217	233	249	265	281		
												16
271	297	313	329	345	361	377	393	409	425	441	1	1.6
272	457	473	489	505	521	537	553	569	584	600	2	3.2
273	616	632	648	664	680	696	712	727	743	759	3	4.8
274	775	791	807	823	838	854	870	886	902	917	4	6.4
275	933	949	965	981	996	*012	*028	*044	*059	*075	5	8.0
276	44 091	107	122	138	154	170	185	201	217	232	6	9.6
277	248	264	279	295	311	326	342	358	373	389	7	11.2
278	404	420	436	451	467	483	498	514	529	545	8	12.8
279	560	576	592	607	623	638	654	669	685	700	9	14.4
280	716	731	747	762	778	793	809	824	840	855		
												15
281	871	886	902	917	932	948	963	979	994	*010	1	1.5
282	45 025	040	056	071	086	102	117	133	148	163	2	3.0
283	179	194	209	225	240	255	271	286	301	317	3	4.5
284	332	347	362	378	393	408	423	439	454	469	4	6.0
285	484	500	515	530	545	561	576	591	606	621	5	7.5
286	637	652	667	682	697	712	728	743	758	773	6	9.0
287	788	803	818	834	849	864	879	894	909	924	7	10.5
288	939	954	969	984	*000	*015	*030	*045	*060	*075	8	12.0
289	46 090	105	120	135	150	165	180	195	210	225	9	13.5
290	240	255	270	285	300	315	330	345	359	374		
												14
291	389	404	419	434	449	464	479	494	509	523	1	1.4
292	538	553	568	583	598	613	627	642	657	672	2	2.8
293	687	702	716	731	746	761	776	790	805	820	3	4.2
294	835	850	864	879	894	909	923	938	953	967	4	5.6
295	982	997	*012	*026	*041	*056	*070	*085	*100	*114	5	7.0
296	47 129	144	159	173	188	202	217	232	246	261	6	8.4
297	276	290	305	319	334	349	363	378	392	407	7	9.8
298	422	436	451	465	480	494	509	524	538	553	8	11.2
299	567	582	596	611	625	640	654	669	683	698	9	12.6
300	712	727	741	756	770	784	799	813	828	842		

N	L 0	1	2	3	4	5	6	7	8	9	P	P

2460″	=0° 41′	S	4.68 556	T	4.68 560	2760″	=0° 46′	S	4.68 556	T	4.68 560
2520	=0 42		4.68 556		4.68 560	2820	=0 47		4.68 556		4.68 560
2580	=0 43		4.68 556		4.68 560	2880	=0 48		4.68 556		4.68 560
2640	=0 44		4.68 556		4.68 560	2940	=0 49		4.68 556		4.68 560
2700	=0 45		4.68 556		4.68 560	3000	=0 50		4.68 556		4.68 561

N	L 0	1	2	3	4	5	6	7	8	9	P	P
300	47 712	727	741	756	770	784	799	813	828	842		
301	857	871	885	900	914	929	943	958	972	986		
302	48 001	015	029	044	058	073	087	101	116	130		
303	144	159	173	187	202	216	230	244	259	273		15
304	287	302	316	330	344	359	373	387	401	416	1	1.5
305	430	444	458	473	487	501	515	530	544	558	2	3.0
306	572	586	601	615	629	643	657	671	686	700	3	4.5
307	714	728	742	756	770	785	799	813	827	841	4	6.0
308	855	869	883	897	911	926	940	954	968	982	5	7.5
309	996	*010	*024	*038	*052	*066	*080	*094	*108	*122	6	9.0
310	49 136	150	164	178	192	206	220	234	248	262	7	10.5
311	276	290	304	318	332	346	360	374	388	402	8	12.0
312	415	429	443	457	471	485	499	513	527	541	9	13.5
313	554	568	582	596	610	624	638	651	665	679		
314	693	707	721	734	748	762	776	790	803	817		
315	831	845	859	872	886	900	914	927	941	955		14
316	969	982	996	*010	*024	*037	*051	*065	*079	*092	1	1.4
317	50 106	120	133	147	161	174	188	202	215	229	2	2.8
318	243	256	270	284	297	311	325	338	352	365	3	4.2
319	379	393	406	420	433	447	461	474	488	501	4	5.6
320	515	529	542	556	569	583	596	610	623	637	5	7.0
321	651	664	678	691	705	718	732	745	759	772	6	8.4
322	786	799	813	826	840	853	866	880	893	907	7	9.8
323	920	934	947	961	974	987	*001	*014	*028	*041	8	11.2
324	51 055	068	081	095	108	121	135	148	162	175	9	12.6
325	188	202	215	228	242	255	268	282	295	308		
326	322	335	348	362	375	388	402	415	428	441		
327	455	468	481	495	508	521	534	548	561	574		13
328	587	601	614	627	640	654	667	680	693	706	1	1.3
329	720	733	746	759	772	786	799	812	825	838	2	2.6
330	851	865	878	891	904	917	930	943	957	970	3	3.9
331	983	996	*009	*022	*035	*048	*061	*075	*088	*101	4	5.2
332	52 114	127	140	153	166	179	192	205	218	231	5	6.5
333	244	257	270	284	297	310	323	336	349	362	6	7.8
334	375	388	401	414	427	440	453	466	479	492	7	9.1
335	504	517	530	543	556	569	582	595	608	621	8	10.4
336	634	647	660	673	686	699	711	724	737	750	9	11.7
337	763	776	789	802	815	827	840	853	866	879		
338	892	905	917	930	943	956	969	982	994	*007		12
339	53 020	033	046	058	071	084	097	110	122	135	1	1.2
340	148	161	173	186	199	212	224	237	250	263	2	2.4
341	275	288	301	314	326	339	352	364	377	390	3	3.6
342	403	415	428	441	453	466	479	491	504	517	4	4.8
343	529	542	555	567	580	593	605	618	631	643	5	6.0
344	656	668	681	694	706	719	732	744	757	769	6	7.2
345	782	794	807	820	832	845	857	870	882	895	7	8.4
346	908	920	933	945	958	970	983	995	*008	*020	8	9.6
347	54 033	045	058	070	083	095	108	120	133	145	9	10.8
348	158	170	183	195	208	220	233	245	258	270		
349	283	295	307	320	332	345	357	370	382	394		
350	407	419	432	444	456	469	481	494	506	518		

N	L 0	1	2	3	4	5	6	7	8	9	P	P

3000″ = 0° 50′	S	4.68 556	T	4.68 561	3300″ = 0° 55′	S	4.68 556	T	4.68 561
3060 = 0 51		4.68 556		4.68 561	3360 = 0 56		4.68 556		4.68 561
3120 = 0 52		4.68 556		4.68 561	3420 = 0 57		4.68 555		4.68 561
3180 = 0 53		4.68 556		4.68 561	3480 = 0 58		4.68 555		4.68 562
3240 = 0 54		4.68 556		4.68 561	3540 = 0 59		4.68 555		4.68 562

350—400

N	L 0	1	2	3	4	5	6	7	8	9	P P
350	54 407	419	432	444	456	469	481	494	506	518	
351	531	543	555	568	580	593	605	617	630	642	
352	654	667	679	691	704	716	728	741	753	765	
353	777	790	802	814	827	839	851	864	876	888	13
354	900	913	925	937	949	962	974	986	998	*011	1 | 1.3
355	55 023	035	047	060	072	084	096	108	121	133	2 | 2.6
356	145	157	169	182	194	206	218	230	242	255	3 | 3.9
357	267	279	291	303	315	328	340	352	364	376	4 | 5.2
358	388	400	413	425	437	449	461	473	485	497	5 | 6.5
359	509	522	534	546	558	570	582	594	606	618	6 | 7.8
360	630	642	654	666	678	691	703	715	727	739	7 | 9.1
361	751	763	775	787	799	811	823	835	847	859	8 | 10.4
362	871	883	895	907	919	931	943	955	967	979	9 | 11.7
363	991	*003	*015	*027	*038	*050	*062	*074	*086	*098	
364	56 110	122	134	146	158	170	182	194	205	217	
365	229	241	253	265	277	289	301	312	324	336	
366	348	360	372	384	396	407	419	431	443	455	12
367	467	478	490	502	514	526	538	549	561	573	1 | 1.2
368	585	597	608	620	632	644	656	667	679	691	2 | 2.4
369	703	714	726	738	750	761	773	785	797	808	3 | 3.6
370	820	832	844	855	867	879	891	902	914	926	4 | 4.8
371	937	949	961	972	984	996	*008	*019	*031	*043	5 | 6.0
372	57 054	066	078	089	101	113	124	136	148	159	6 | 7.2
373	171	183	194	206	217	229	241	252	264	276	7 | 8.4
374	287	299	310	322	334	345	357	368	380	392	8 | 9.6
375	403	415	426	438	449	461	473	484	496	507	9 | 10.8
376	519	530	542	553	565	576	588	600	611	623	
377	634	646	657	669	680	692	703	715	726	738	
378	749	761	772	784	795	807	818	830	841	852	11
379	864	875	887	898	910	921	933	944	955	967	1 | 1.1
380	978	990	*001	*013	*024	*035	*047	*058	*070	*081	2 | 2.2
381	58 092	104	115	127	138	149	161	172	184	195	3 | 3.3
382	206	218	229	240	252	263	274	286	297	309	4 | 4.4
383	320	331	343	354	365	377	388	399	410	422	5 | 5.5
384	433	444	456	467	478	490	501	512	524	535	6 | 6.6
385	546	557	569	580	591	602	614	625	636	647	7 | 7.7
386	659	670	681	692	704	715	726	737	749	760	8 | 8.8
387	771	782	794	805	816	827	838	850	861	872	9 | 9.9
388	883	894	906	917	928	939	950	961	973	984	
389	995	*006	*017	*028	*040	*051	*062	*073	*084	*095	10
390	59 106	118	129	140	151	162	173	184	195	207	1 | 1.0
391	218	229	240	251	262	273	284	295	306	318	2 | 2.0
392	329	340	351	362	373	384	395	406	417	428	3 | 3.0
393	439	450	461	472	483	494	506	517	528	539	4 | 4.0
394	550	561	572	583	594	605	616	627	638	649	5 | 5.0
395	660	671	682	693	704	715	726	737	748	759	6 | 6.0
396	770	780	791	802	813	824	835	846	857	868	7 | 7.0
397	879	890	901	912	923	934	945	956	966	977	8 | 8.0
398	988	999	*010	*021	*032	*043	*054	*065	*076	*086	9 | 9.0
399	60 097	108	119	130	141	152	163	173	184	195	
400	206	217	228	239	249	260	271	282	293	304	

N	L 0	1	2	3	4	5	6	7	8	9	P P

3480″	=0° 58′	S	4.68 555	T	4.68 562	3780″	=1° 3′	S	4.68 555	T	4.68 562
3540	=0 59		4.68 555		4.68 562	3840	=1 4		4.68 555		4.68 563
3600	=1 0		4.68 555		4.68 562	3900	=1 5		4.68 555		4.68 563
3660	=1 1		4.68 555		4.68 562	3960	=1 6		4.68 555		4.68 563
3720	=1 2		4.68 555		4.68 562	4020	=1 7		4.68 555		4.68 563

N	L 0	1	2	3	4	5	6	7	8	9	P P
400	60 206	217	228	239	249	260	271	282	293	304	
401	314	325	336	347	358	369	379	390	401	412	
402	423	433	444	455	466	477	487	498	509	520	
403	531	541	552	563	574	584	595	606	617	627	
404	638	649	660	670	681	692	703	713	724	735	
405	746	756	767	778	788	799	810	821	831	842	
406	853	863	874	885	895	906	917	927	938	949	11
407	959	970	981	991	*002	*013	*023	*034	*045	*055	1 1.1
408	61 066	077	087	098	109	119	130	140	151	162	2 2.2
409	172	183	194	204	215	225	236	247	257	268	3 3.3
410	278	289	300	310	321	331	342	352	363	374	4 4.4 5 5.5 6 6.6
411	384	395	405	416	426	437	448	458	469	479	7 7.7
412	490	500	511	521	532	542	553	563	574	584	8 8.8
413	595	606	616	627	637	648	658	669	679	690	9 9.9
414	700	711	721	731	742	752	763	773	784	794	
415	805	815	826	836	847	857	868	878	888	899	
416	909	920	930	941	951	962	972	982	993	*003	
417	62 014	024	034	045	055	066	076	086	097	107	
418	118	128	138	149	159	170	180	190	201	211	
419	221	232	242	252	263	273	284	294	304	315	
420	325	335	346	356	366	377	387	397	408	418	
421	428	439	449	459	469	480	490	500	511	521	10
422	531	542	552	562	572	583	593	603	613	624	1 1.0
423	634	644	655	665	675	685	696	706	716	726	2 2.0
424	737	747	757	767	778	788	798	808	818	829	3 3.0
425	839	849	859	870	880	890	900	910	921	931	4 4.0
426	941	951	961	972	982	992	*002	*012	*022	*033	5 5.0 6 6.0
427	63 043	053	063	073	083	094	104	114	124	134	7 7.0
428	144	155	165	175	185	195	205	215	225	236	8 8.0
429	246	256	266	276	286	296	306	317	327	337	9 9.0
430	347	357	367	377	387	397	407	417	428	438	
431	448	458	468	478	488	498	508	518	528	538	
432	548	558	568	579	589	599	609	619	629	639	
433	649	659	669	679	689	699	709	719	729	739	
434	749	759	769	779	789	799	809	819	829	839	
435	849	859	869	879	889	899	909	919	929	939	
436	949	959	969	979	988	998	*008	*018	*028	*038	
437	64 048	058	068	078	088	098	108	118	128	137	9
438	147	157	167	177	187	197	207	217	227	237	1 0.9
439	246	256	266	276	286	296	306	316	326	335	2 1.8
440	345	355	365	375	385	395	404	414	424	434	3 2.7 4 3.6 5 4.5
441	444	454	464	473	483	493	503	513	523	532	6 5.4
442	542	552	562	572	582	591	601	611	621	631	7 6.3
443	640	650	660	670	680	689	699	709	719	729	8 7.2
444	738	748	758	768	777	787	797	807	816	826	9 8.1
445	836	846	856	865	875	885	895	904	914	924	
446	933	943	953	963	972	982	992	*002	*011	*021	
447	65 031	040	050	060	070	079	089	099	108	118	
448	128	137	147	157	167	176	186	196	205	215	
449	225	234	244	254	263	273	283	292	302	312	
450	321	331	341	350	360	369	379	389	398	408	
N	L 0	1	2	3	4	5	6	7	8	9	P P

3960″	= 1° 6′	S 4.68 555	T 4.68 563		4260″	= 1° 11′	S 4.68 554	T 4.68 564		
4020	= 1 7	4.68 555	4.68 563		4320	= 1 12	4.68 554	4.68 564		
4080	= 1 8	4.68 555	4.68 563		4380	= 1 13	4.68 554	4.68 564		
4140	= 1 9	4.68 555	4.68 563		4440	= 1 14	4.68 554	4.68 564		
4200	= 1 10	4.68 554	4.68 563		4500	= 1 15	4.68 554	4.68 564		

450—500

N	L 0	1	2	3	4	5	6	7	8	9	P P
450	65 321	331	341	350	360	369	379	389	398	408	
451	418	427	437	447	456	466	475	485	495	504	
452	514	523	533	543	552	562	571	581	591	600	
453	610	619	629	639	648	658	667	677	686	696	
454	706	715	725	734	744	753	763	772	782	792	
455	801	811	820	830	839	849	858	868	877	887	
456	896	906	916	925	935	944	954	963	973	982	
457	992	*001	*011	*020	*030	*039	*049	*058	*068	*077	10
458	66 087	096	106	115	124	134	143	153	162	172	1 1.0
459	181	191	200	210	219	229	238	247	257	266	2 2.0
460	276	285	295	304	314	323	332	342	351	361	3 3.0
461	370	380	389	398	408	417	427	436	445	455	4 4.0
462	464	474	483	492	502	511	521	530	539	549	5 5.0
463	558	567	577	586	596	605	614	624	633	642	6 6.0
464	652	661	671	680	689	699	708	717	727	736	7 7.0
465	745	755	764	773	783	792	801	811	820	829	8 8.0
466	839	848	857	867	876	885	894	904	913	922	9 9.0
467	932	941	950	960	969	978	987	997	*006	*015	
468	67 025	034	043	052	062	071	080	089	099	108	
469	117	127	136	145	154	164	173	182	191	201	
470	210	219	228	237	247	256	265	274	284	293	
471	302	311	321	330	339	348	357	367	376	385	9
472	394	403	413	422	431	440	449	459	468	477	1 0.9
473	486	495	504	514	523	532	541	550	560	569	2 1.8
474	578	587	596	605	614	624	633	642	651	660	3 2.7
475	669	679	688	697	706	715	724	733	742	752	4 3.6
476	761	770	779	788	797	806	815	825	834	843	5 4.5
477	852	861	870	879	888	897	906	916	925	934	6 5.4
478	943	952	961	970	979	988	997	*006	*015	*024	7 6.3
479	68 034	043	052	061	070	079	088	097	106	115	8 7.2
480	124	133	142	151	160	169	178	187	196	205	9 8.1
481	215	224	233	242	251	260	269	278	287	296	
482	305	314	323	332	341	350	359	368	377	386	
483	395	404	413	422	431	440	449	458	467	476	
484	485	494	502	511	520	529	538	547	556	565	
485	574	583	592	601	610	619	628	637	646	655	
486	664	673	681	690	699	708	717	726	735	744	8
487	753	762	771	780	789	797	806	815	824	833	1 0.8
488	842	851	860	869	878	886	895	904	913	922	2 1.6
489	931	940	949	958	966	975	984	993	*002	*011	3 2.4
490	69 020	028	037	046	055	064	073	082	090	099	4 3.2
491	108	117	126	135	144	152	161	170	179	188	5 4.0
492	197	205	214	223	232	241	249	258	267	276	6 4.8
493	285	294	302	311	320	329	338	346	355	364	7 5.6
494	373	381	390	399	408	417	425	434	443	452	8 6.4
495	461	469	478	487	496	504	513	522	531	539	9 7.2
496	548	557	566	574	583	592	601	609	618	627	
497	636	644	653	662	671	679	688	697	705	714	
498	723	732	740	749	758	767	775	784	793	801	
499	810	819	827	836	845	854	862	871	880	888	
500	897	906	914	923	932	940	949	958	966	975	

N	L 0	1	2	3	4	5	6	7	8	9	P P

4500″	=1° 15′	S	4.68 554	T	4.68 564	4800″	=1° 20′	S	4.68 554	T	4.68 565
4560	=1 16		4.68 554		4.68 565	4860	=1 21		4.68 553		4.68 566
4620	=1 17		4.68 554		4.68 565	4920	=1 22		4.68 553		4.68 566
4680	=1 18		4.68 554		4.68 565	4980	=1 23		4.68 553		4.68 566
4740	=1 19		4.68 554		4.68 565	5040	=1 24		4.68 553		4.68 566

500—550

N	L 0	1	2	3	4	5	6	7	8	9	P P
500	69 897	906	914	923	932	940	949	958	966	975	
501	984	992	*001	*010	*018	*027	*036	*044	*053	*062	
502	70 070	079	088	096	105	114	122	131	140	148	
503	157	165	174	183	191	200	209	217	226	234	
504	243	252	260	269	278	286	295	303	312	321	9
505	329	338	346	355	364	372	381	389	398	406	1 | 0.9
506	415	424	432	441	449	458	467	475	484	492	2 | 1.8
507	501	509	518	526	535	544	552	561	569	578	3 | 2.7
508	586	595	603	612	621	629	638	646	655	663	4 | 3.6
509	672	680	689	697	706	714	723	731	740	749	5 | 4.5
510	757	766	774	783	791	800	808	817	825	834	6 | 5.4
511	842	851	859	868	876	885	893	902	910	919	7 | 6.3
512	927	935	944	952	961	969	978	986	995	*003	8 | 7.2
513	71 012	020	029	037	046	054	063	071	079	088	9 | 8.1
514	096	105	113	122	130	139	147	155	164	172	
515	181	189	198	206	214	223	231	240	248	257	
516	265	273	282	290	299	307	315	324	332	341	
517	349	357	366	374	383	391	399	408	416	425	
518	433	441	450	458	466	475	483	492	500	508	
519	517	525	533	542	550	559	567	575	584	592	
520	600	609	617	625	634	642	650	659	667	675	
521	684	692	700	709	717	725	734	742	750	759	8
522	767	775	784	792	800	809	817	825	834	842	1 | 0.8
523	850	858	867	875	883	892	900	908	917	925	2 | 1.6
524	933	941	950	958	966	975	983	991	999	*008	3 | 2.4
525	72 016	024	032	041	049	057	066	074	082	090	4 | 3.2
526	099	107	115	123	132	140	148	156	165	173	5 | 4.0
527	181	189	198	206	214	222	230	239	247	255	6 | 4.8
528	263	272	280	288	296	304	313	321	329	337	7 | 5.6
529	346	354	362	370	378	387	395	403	411	419	8 | 6.4
530	428	436	444	452	460	469	477	485	493	501	9 | 7.2
531	509	518	526	534	542	550	558	567	575	583	
532	591	599	607	616	624	632	640	648	656	665	
533	673	681	689	697	705	713	722	730	738	746	
534	754	762	770	779	787	795	803	811	819	827	
535	835	843	852	860	868	876	884	892	900	908	
536	916	925	933	941	949	957	965	973	981	989	
537	997	*006	*014	*022	*030	*038	*046	*054	*062	*070	7
538	73 078	086	094	102	111	119	127	135	143	151	1 | 0.7
539	159	167	175	183	191	199	207	215	223	231	2 | 1.4
540	239	247	255	263	272	280	288	296	304	312	3 | 2.1
541	320	328	336	344	352	360	368	376	384	392	4 | 2.8
542	400	408	416	424	432	440	448	456	464	472	5 | 3.5
543	480	488	496	504	512	520	528	536	544	552	6 | 4.2
544	560	568	576	584	592	600	608	616	624	632	7 | 4.9
545	640	648	656	664	672	679	687	695	703	711	8 | 5.6
546	719	727	735	743	751	759	767	775	783	791	9 | 6.3
547	799	807	815	823	830	838	846	854	862	870	
548	878	886	894	902	910	918	926	933	941	949	
549	957	965	973	981	989	997	*005	*013	*020	*028	
550	74 036	044	052	060	068	076	084	092	099	107	

N	L 0	1	2	3	4	5	6	7	8	9	P P

4980″ = 1° 23′	S	4.68 553	T	4.68 566	5280″ = 1° 28′	S	4.68 553	T	4.68 567
5040 = 1 24		4.68 553		4.68 566	5340 = 1 29		4.68 553		4.68 567
5100 = 1 25		4.68 553		4.68 566	5400 = 1 30		4.68 553		4.68 567
5160 = 1 26		4.68 553		4.68 567	5460 = 1 31		4.68 552		4.68 568
5220 = 1 27		4.68 553		4.68 567	5520 = 1 32		4.68 552		4.68 568

550—600

N	L 0	1	2	3	4	5	6	7	8	9	P	P
550	74 036	044	052	060	068	076	084	092	099	107		
551	115	123	131	139	147	155	162	170	178	186		
552	194	202	210	218	225	233	241	249	257	265		
553	273	280	288	296	304	312	320	327	335	343		
554	351	359	367	374	382	390	398	406	414	421		
555	429	437	445	453	461	468	476	484	492	500		
556	507	515	523	531	539	547	554	562	570	578		
557	586	593	601	609	617	624	632	640	648	656		
558	663	671	679	687	695	702	710	718	726	733		
559	741	749	757	764	772	780	788	796	803	811		
560	819	827	834	842	850	858	865	873	881	889		
561	896	904	912	920	927	935	943	950	958	966		8
562	974	981	989	997	*005	*012	*020	*028	*035	*043		
563	75 051	059	066	074	082	089	097	105	113	120	1	0.8
564	128	136	143	151	159	166	174	182	189	197	2	1.6
565	205	213	220	228	236	243	251	259	266	274	3	2.4
566	282	289	297	305	312	320	328	335	343	351	4	3.2
567	358	366	374	381	389	397	404	412	420	427	5	4.0
568	435	442	450	458	465	473	481	488	496	504	6	4.8
569	511	519	526	534	542	549	557	565	572	580	7	5.6
570	587	595	603	610	618	626	633	641	648	656	8	6.4
571	664	671	679	686	694	702	709	717	724	732	9	7.2
572	740	747	755	762	770	778	785	793	800	808		
573	815	823	831	838	846	853	861	868	876	884		
574	891	899	906	914	921	929	937	944	952	959		
575	967	974	982	989	997	*005	*012	*020	*027	*035		
576	76 042	050	057	065	072	080	087	095	103	110		
577	118	125	133	140	148	155	163	170	178	185		
578	193	200	208	215	223	230	238	245	253	260		
579	268	275	283	290	298	305	313	320	328	335		
580	343	350	358	365	373	380	388	395	403	410		
581	418	425	433	440	448	455	462	470	477	485		7
582	492	500	507	515	522	530	537	545	552	559	1	0.7
583	567	574	582	589	597	604	612	619	626	634	2	1.4
584	641	649	656	664	671	678	686	693	701	708	3	2.1
585	716	723	730	738	745	753	760	768	775	782	4	2.8
586	790	797	805	812	819	827	834	842	849	856	5	3.5
587	864	871	879	886	893	901	908	916	923	930	6	4.2
588	938	945	953	960	967	975	982	989	997	*004	7	4.9
589	77 012	019	026	034	041	048	056	063	070	078	8	5.6
590	085	093	100	107	115	122	129	137	144	151	9	6.3
591	159	166	173	181	188	195	203	210	217	225		
592	232	240	247	254	262	269	276	283	291	298		
593	305	313	320	327	335	342	349	357	364	371		
594	379	386	393	401	408	415	422	430	437	444		
595	452	459	466	474	481	488	495	503	510	517		
596	525	532	539	546	554	561	568	576	583	590		
597	597	605	612	619	627	634	641	648	656	663		
598	670	677	685	692	699	706	714	721	728	735		
599	743	750	757	764	772	779	786	793	801	808		
600	815	822	830	837	844	851	859	866	873	880		

N	L 0	1	2	3	4	5	6	7	8	9	P	P

5460″	=1° 31′	S	4.68 552	T	4.68 568	5760″	=1° 36′	S	4.68 552	T	4.68 569
5520	=1 32		4.68 552		4.68 568	5820	=1 37		4.68 552		4.68 569
5580	=1 33		4.68 552		4.68 568	5880	=1 38		4.68 552		4.68 569
5640	=1 34		4.68 552		4.68 568	5940	=1 39		4.68 551		4.68 569
5700	=1 35		4.68 552		4.68 569	6000	=1 40		4.68 551		4.68 570

600—650

N	L 0	1	2	3	4	5	6	7	8	9
600	77 815	822	830	837	844	851	859	866	873	880
601	887	895	902	909	916	924	931	938	945	952
602	960	967	974	981	988	996	*003	*010	*017	*025
603	78 032	039	046	053	061	068	075	082	089	097
604	104	111	118	125	132	140	147	154	161	168
605	176	183	190	197	204	211	219	226	233	240
606	247	254	262	269	276	283	290	297	305	312
607	319	326	333	340	347	355	362	369	376	383
608	390	398	405	412	419	426	433	440	447	455
609	462	469	476	483	490	497	504	512	519	526
610	533	540	547	554	561	569	576	583	590	597
611	604	611	618	625	633	640	647	654	661	668
612	675	682	689	696	704	711	718	725	732	739
613	746	753	760	767	774	781	789	796	803	810
614	817	824	831	838	845	852	859	866	873	880
615	888	895	902	909	916	923	930	937	944	951
616	958	965	972	979	986	993	*000	*007	*014	*021
617	79 029	036	043	050	057	064	071	078	085	092
618	099	106	113	120	127	134	141	148	155	162
619	169	176	183	190	197	204	211	218	225	232
620	239	246	253	260	267	274	281	288	295	302
621	309	316	323	330	337	344	351	358	365	372
622	379	386	393	400	407	414	421	428	435	442
623	449	456	463	470	477	484	491	498	505	511
624	518	525	532	539	546	553	560	567	574	581
625	588	595	602	609	616	623	630	637	644	650
626	657	664	671	678	685	692	699	706	713	720
627	727	734	741	748	754	761	768	775	782	789
628	796	803	810	817	824	831	837	844	851	858
629	865	872	879	886	893	900	906	913	920	927
630	934	941	948	955	962	969	975	982	989	996
631	80 003	010	017	024	030	037	044	051	058	065
632	072	079	085	092	099	106	113	120	127	134
633	140	147	154	161	168	175	182	188	195	202
634	209	216	223	229	236	243	250	257	264	271
635	277	284	291	298	305	312	318	325	332	339
636	346	353	359	366	373	380	387	393	400	407
637	414	421	428	434	441	448	455	462	468	475
638	482	489	496	502	509	516	523	530	536	543
639	550	557	564	570	577	584	591	598	604	611
640	618	625	632	638	645	652	659	665	672	679
641	686	693	699	706	713	720	726	733	740	747
642	754	760	767	774	781	787	794	801	808	814
643	821	828	835	841	848	855	862	868	875	882
644	889	895	902	909	916	922	929	936	943	949
645	956	963	969	976	983	990	996	*003	*010	*017
646	81 023	030	037	043	050	057	064	070	077	084
647	090	097	104	111	117	124	131	137	144	151
648	158	164	171	178	184	191	198	204	211	218
649	224	231	238	245	251	258	265	271	278	285
650	291	298	305	311	318	325	331	338	345	351

N	L 0	1	2	3	4	5	6	7	8	9

P	P
1	0.8
2	1.6
3	2.4
4	3.2
5	4.0
6	4.8
7	5.6
8	6.4
9	7.2

8

P	P
1	0.7
2	1.4
3	2.1
4	2.8
5	3.5
6	4.2
7	4.9
8	5.6
9	6.3

7

P	P
1	0.6
2	1.2
3	1.8
4	2.4
5	3.0
6	3.6
7	4.2
8	4.8
9	5.4

6

6000″	= 1′ 40′	S	4.68 551	T	4.68 570	6300″	= 1″ 45′	S	4.68 551	T	4.68 571
6060	= 1 41		4.68 551		4.68 570	6360	= 1 46		4.68 551		4.68 571
6120	= 1 42		4.68 551		4.68 570	6420	= 1 47		4.68 550		4.68 572
6180	= 1 43		4.68 551		4.68 570	6480	= 1 48		4.68 550		4.68 572
6240	= 1 44		4.68 551		4.68 571	6540	= 1 49		4.68 550		4.68 572

650—700

N	L 0	1	2	3	4	5	6	7	8	9	P P
650	81 291	298	305	311	318	325	331	338	345	351	
651	358	365	371	378	385	391	398	405	411	418	
652	425	431	438	445	451	458	465	471	478	485	
653	491	498	505	511	518	525	531	538	544	551	
654	558	564	571	578	584	591	598	604	611	617	
655	624	631	637	644	651	657	664	671	677	684	
656	690	697	704	710	717	723	730	737	743	750	
657	757	763	770	776	783	790	796	803	809	816	
658	823	829	836	842	849	856	862	869	875	882	
659	889	895	902	908	915	921	928	935	941	948	
660	954	961	968	974	981	987	994	*000	*007	*014	
661	82 020	027	033	040	046	053	060	066	073	079	
662	086	092	099	105	112	119	125	132	138	145	7
663	151	158	164	171	178	184	191	197	204	210	1 0.7
664	217	223	230	236	243	249	256	263	269	276	2 1.4
665	282	289	295	302	308	315	321	328	334	341	3 2.1
666	347	354	360	367	373	380	387	393	400	406	4 2.8
667	413	419	426	432	439	445	452	458	465	471	5 3.5
668	478	484	491	497	504	510	517	523	530	536	6 4.2
669	543	549	556	562	569	575	582	588	595	601	7 4.9
670	607	614	620	627	633	640	646	653	659	666	8 5.6
671	672	679	685	692	698	705	711	718	724	730	9 6.3
672	737	743	750	756	763	769	776	782	789	795	
673	802	808	814	821	827	834	840	847	853	860	
674	866	872	879	885	892	898	905	911	918	924	
675	930	937	943	950	956	963	969	975	982	988	
676	995	*001	*008	*014	*020	*027	*033	*040	*046	*052	
677	83 059	065	072	078	085	091	097	104	110	117	
678	123	129	136	142	149	155	161	168	174	181	
679	187	193	200	206	213	219	225	232	238	245	
680	251	257	264	270	276	283	289	296	302	308	
681	315	321	327	334	340	347	353	359	366	372	6
682	378	385	391	398	404	410	417	423	429	436	1 0.6
683	442	448	455	461	467	474	480	487	493	499	2 1.2
684	506	512	518	525	531	537	544	550	556	563	3 1.8
685	569	575	582	588	594	601	607	613	620	626	4 2.4
686	632	639	645	651	658	664	670	677	683	689	5 3.0
687	696	702	708	715	721	727	734	740	746	753	6 3.6
688	759	765	771	778	784	790	797	803	809	816	7 4.2
689	822	828	835	841	847	853	860	866	872	879	8 4.8
690	885	891	897	904	910	916	923	929	935	942	9 5.4
691	948	954	960	967	973	979	985	992	998	*004	
692	84 011	017	023	029	036	042	048	055	061	067	
693	073	080	086	092	098	105	111	117	123	130	
694	136	142	148	155	161	167	173	180	186	192	
695	198	205	211	217	223	230	236	242	248	255	
696	261	267	273	280	286	292	298	305	311	317	
697	323	330	336	342	348	354	361	367	373	379	
698	386	392	398	404	410	417	423	429	435	442	
699	448	454	460	466	473	479	485	491	497	504	
700	510	516	522	528	535	541	547	553	559	566	

N	L 0	1	2	3	4	5	6	7	8	9	P P

6480″	=1° 48′	S	4.68 550	T	4.68 572	6780″	=1° 53′	S	4.68 550	T	4.68 573
6540	=1 49		4.68 550		4.68 572	6840	=1 54		4.68 550		4.68 573
6600	=1 50		4.68 550		4.68 572	6900	=1 55		4.68 549		4.68 574
6660	=1 51		4.68 550		4.68 573	6960	=1 56		4.68 549		4.68 574
6720	=1 52		4.68 550		4.68 573	7020	=1 57		4.68 549		4.68 574

N	L 0	1	2	3	4	5	6	7	8	9	P P
700	84 510	516	522	528	533	541	547	553	559	566	
701	572	578	584	590	597	603	609	615	621	628	
702	634	640	646	652	658	665	671	677	683	689	
703	696	702	708	714	720	726	733	739	745	751	
704	757	763	770	776	782	788	794	800	807	813	
705	819	825	831	837	844	850	856	862	868	874	
706	880	887	893	899	905	911	917	924	930	936	
707	942	948	954	960	967	973	979	985	991	997	7
708	85 003	009	016	022	028	034	040	046	052	058	1 0.7
709	065	071	077	083	089	095	101	107	114	120	2 1.4
710	126	132	138	144	150	156	163	169	175	181	3 2.1
711	187	193	199	205	211	217	224	230	236	242	4 2.8
712	248	254	260	266	272	278	285	291	297	303	5 3.5
713	309	315	321	327	333	339	345	352	358	364	6 4.2
714	370	376	382	388	394	400	406	412	418	425	7 4.9
715	431	437	443	449	455	461	467	473	479	485	8 5.6
716	491	497	503	509	516	522	528	534	540	546	9 6.3
717	552	558	564	570	576	582	588	594	600	606	
718	612	618	625	631	637	643	649	655	661	667	
719	673	679	685	691	697	703	709	715	721	727	
720	733	739	745	751	757	763	769	775	781	788	
721	794	800	806	812	818	824	830	836	842	848	6
722	854	860	866	872	878	884	890	896	902	908	1 0.6
723	914	920	926	932	938	944	950	956	962	968	2 1.2
724	974	980	986	992	998	*004	*010	*016	*022	*028	3 1.8
725	86 034	040	046	052	058	064	070	076	082	088	4 2.4
726	094	100	106	112	118	124	130	136	141	147	5 3.0
727	153	159	165	171	177	183	189	195	201	207	6 3.6
728	213	219	225	231	237	243	249	255	261	267	7 4.2
729	273	279	285	291	297	303	308	314	320	326	8 4.8
730	332	338	344	350	356	362	368	374	380	386	9 5.4
731	392	398	404	410	415	421	427	433	439	445	
732	451	457	463	469	475	481	487	493	499	504	
733	510	516	522	528	534	540	546	552	558	564	
734	570	576	581	587	593	599	605	611	617	623	
735	629	635	641	646	652	658	664	670	676	682	
736	688	694	700	705	711	717	723	729	735	741	5
737	747	753	759	764	770	776	782	788	794	800	1 0.5
738	806	812	817	823	829	835	841	847	853	859	2 1.0
739	864	870	876	882	888	894	900	906	911	917	3 1.5
740	923	929	935	941	947	953	958	964	970	976	4 2.0
741	982	988	994	999	*005	*011	*017	*023	*029	*035	5 2.5
742	87 040	046	052	058	064	070	075	081	087	093	6 3.0
743	099	105	111	116	122	128	134	140	146	151	7 3.5
744	157	163	169	175	181	186	192	198	204	210	8 4.0
745	216	221	227	233	239	245	251	256	262	268	9 4.5
746	274	280	286	291	297	303	309	315	320	326	
747	332	338	344	349	355	361	367	373	379	384	
748	390	396	402	408	413	419	425	431	437	442	
749	448	454	460	466	471	477	483	489	495	500	
750	506	512	518	523	529	535	541	547	552	558	

N	L 0	1	2	3	4	5	6	7	8	9	P P

6960″ = 1° 56′	S	4.68 549	T	4.68 574	7260″ = 2° 1′	S	4.68 549	T	4.68 575
7020 = 1 57		4.68 549		4.68 574	7320 = 2 2		4.68 548		4.68 576
7080 = 1 58		4.68 549		4.68 575	7380 = 2 3		4.68 548		4.68 576
7140 = 1 59		4.68 549		4.68 575	7440 = 2 4		4.68 548		4.68 576
7200 = 2 0		4.68 549		4.68 575	7500 = 2 5		4.68 548		4.68 577

750—800

N	L 0	1	2	3	4	5	6	7	8	9	P P
750	87 506	512	518	523	529	535	541	547	552	558	
751	564	570	576	581	587	593	599	604	610	616	
752	622	628	633	639	645	651	656	662	668	674	
753	679	685	691	697	703	708	714	720	726	731	
754	737	743	749	754	760	766	772	777	783	789	
755	795	800	806	812	818	823	829	835	841	846	
756	852	858	864	869	875	881	887	892	898	904	
757	910	915	921	927	933	938	944	950	955	961	
758	967	973	978	984	990	996	*001	*007	*013	*018	
759	88 024	030	036	041	047	053	058	064	070	076	
760	081	087	093	098	104	110	116	121	127	133	
761	138	144	150	156	161	167	173	178	184	190	
762	195	201	207	213	218	224	230	235	241	247	
763	252	258	264	270	275	281	287	292	298	304	6
764	309	315	321	326	332	338	343	349	355	360	1 | 0.6
765	366	372	377	383	389	395	400	406	412	417	2 | 1.2
766	423	429	434	440	446	451	457	463	468	474	3 | 1.8
767	480	485	491	497	502	508	513	519	525	530	4 | 2.4
768	536	542	547	553	559	564	570	576	581	587	5 | 3.0
769	593	598	604	610	615	621	627	632	638	643	6 | 3.6
770	649	655	660	666	672	677	683	689	694	700	7 | 4.2
771	705	711	717	722	728	734	739	745	750	756	8 | 4.8
772	762	767	773	779	784	790	795	801	807	812	9 | 5.4
773	818	824	829	835	840	846	852	857	863	868	
774	874	880	885	891	897	902	908	913	919	925	
775	930	936	941	947	953	958	964	969	975	981	
776	986	992	997	*003	*009	*014	*020	*025	*031	*037	
777	89 042	048	053	059	064	070	076	081	087	092	
778	098	104	109	115	120	126	131	137	143	148	
779	154	159	165	170	176	182	187	193	198	204	
780	209	215	221	226	232	237	243	248	254	260	5
781	265	271	276	282	287	293	298	304	310	315	1 | 0.5
782	321	326	332	337	343	348	354	360	365	371	2 | 1.0
783	376	382	387	393	398	404	409	415	421	426	3 | 1.5
784	432	437	443	448	454	459	465	470	476	481	4 | 2.0
785	487	492	498	504	509	515	520	526	531	537	5 | 2.5
786	542	548	553	559	564	570	575	581	586	592	6 | 3.0
787	597	603	609	614	620	625	631	636	642	647	7 | 3.5
788	653	658	664	669	675	680	686	691	697	702	8 | 4.0
789	708	713	719	724	730	735	741	746	752	757	9 | 4.5
790	763	768	774	779	785	790	796	801	807	812	
791	818	823	829	834	840	845	851	856	862	867	
792	873	878	883	889	894	900	905	911	916	922	
793	927	933	938	944	949	955	960	966	971	977	
794	982	988	993	998	*004	*009	*015	*020	*026	*031	
795	90 037	042	048	053	059	064	069	075	080	086	
796	091	097	102	108	113	119	124	129	135	140	
797	146	151	157	162	168	173	179	184	189	195	
798	200	206	211	217	222	227	233	238	244	249	
799	255	260	266	271	276	282	287	293	298	304	
800	309	314	320	325	331	336	342	347	352	358	

N	L 0	1	2	3	4	5	6	7	8	9	P P

7500″ = 2° 5′	S	4.68 548	T	4.68 577	7800″ = 2° 10′	S	4.68 547	T	4.68 578
7560 = 2 6		4.68 548		4.68 577	7860 = 2 11		4.68 547		4.68 579
7620 = 2 7		4.68 548		4.68 577	7920 = 2 12		4.68 547		4.68 579
7680 = 2 8		4.68 547		4.68 578	7980 = 2 13		4.68 547		4.68 579
7740 = 2 9		4.68 547		4.68 578	8040 = 2 14		4.68 546		4.68 579

800—850

N	L 0	1	2	3	4	5	6	7	8	9	P P
800	90 309	314	320	325	331	336	342	347	352	358	
801	363	369	374	380	385	390	396	401	407	412	
802	417	423	428	434	439	445	450	455	461	466	
803	472	477	482	488	493	499	504	509	515	520	
804	526	531	536	542	547	553	558	563	569	574	
805	580	585	590	596	601	607	612	617	623	628	
806	634	639	644	650	655	660	666	671	677	682	
807	687	693	698	703	709	714	720	725	730	736	
808	741	747	752	757	763	768	773	779	784	789	
809	795	800	806	811	816	822	827	832	838	843	
810	849	854	859	865	870	875	881	886	891	897	
811	902	907	913	918	924	929	934	940	945	950	6
812	956	961	966	972	977	982	988	993	998	*004	1 0.6
813	91 009	014	020	025	030	036	041	046	052	057	2 1.2
814	062	068	073	078	084	089	094	100	105	110	3 1.8
815	116	121	126	132	137	142	148	153	158	164	4 2.4
816	169	174	180	185	190	196	201	206	212	217	5 3.0
817	222	228	233	238	243	249	254	259	265	270	6 3.6
818	275	281	286	291	297	302	307	312	318	323	7 4.2
819	328	334	339	344	350	355	360	365	371	376	8 4.8
820	381	387	392	397	403	408	413	418	424	429	9 5.4
821	434	440	445	450	455	461	466	471	477	482	
822	487	492	498	503	508	514	519	524	529	535	
823	540	545	551	556	561	566	572	577	582	587	
824	593	598	603	609	614	619	624	630	635	640	
825	645	651	656	661	666	672	677	682	687	693	
826	698	703	709	714	719	724	730	735	740	745	
827	751	756	761	766	772	777	782	787	793	798	
828	803	808	814	819	824	829	834	840	845	850	
829	855	861	866	871	876	882	887	892	897	903	
830	908	913	918	924	929	934	939	944	950	955	
831	960	965	971	976	981	986	991	997	*002	*007	5
832	92 012	018	023	028	033	038	044	049	054	059	1 0.5
833	065	070	075	080	085	091	096	101	106	111	2 1.0
834	117	122	127	132	137	143	148	153	158	163	3 1.5
835	169	174	179	184	189	195	200	205	210	215	4 2.0
836	221	226	231	236	241	247	252	257	262	267	5 2.5
837	273	278	283	288	293	298	304	309	314	319	6 3.0
838	324	330	335	340	345	350	355	361	366	371	7 3.5
839	376	381	387	392	397	402	407	412	418	423	8 4.0
840	428	433	438	443	449	454	459	464	469	474	9 4.5
841	480	485	490	495	500	505	511	516	521	526	
842	531	536	542	547	552	557	562	567	572	578	
843	583	588	593	598	603	609	614	619	624	629	
844	634	639	645	650	655	660	665	670	675	681	
845	686	691	696	701	706	711	716	722	727	732	
846	737	742	747	752	758	763	768	773	778	783	
847	788	793	799	804	809	814	819	824	829	834	
848	840	845	850	855	860	865	870	875	881	886	
849	891	896	901	906	911	916	921	927	932	937	
850	942	947	952	957	962	967	973	978	983	988	

N	L 0	1	2	3	4	5	6	7	8	9	P P

7980″	=2° 13′	S	4.68 547	T	4.68 579	8280″	=2° 18′	S	4.68 546	T	4.68 581
8040	=2 14		4.68 546		4.68 579	8340	=2 19		4.68 546		4.68 581
8100	=2 15		4.68 546		4.68 580	8400	=2 20		4.68 545		4.68 582
8160	=2 16		4.68 546		4.68 580	8460	=2 21		4.68 545		4.68 582
8220	=2 17		4.68 546		4.68 580	8520	=2 22		4.68 545		4.68 582

850—900

N	L 0	1	2	3	4	5	6	7	8	9	P P
850	92 942	947	952	957	962	967	973	978	983	988	
851	993	998	*003	*008	*013	*018	*024	*029	*034	*039	
852	93 044	049	054	059	064	069	075	080	085	090	
853	095	100	105	110	115	120	125	131	136	141	
854	146	151	156	161	166	171	176	181	186	192	
855	197	202	207	212	217	222	227	232	237	242	
856	247	252	258	263	268	273	278	283	288	293	
857	298	303	308	313	318	323	328	334	339	344	6
858	349	354	359	364	369	374	379	384	389	394	1 | 0.6
859	399	404	409	414	420	425	430	435	440	445	2 | 1.2
860	450	455	460	465	470	475	480	485	490	495	3 | 1.8 4 | 2.4 5 | 3.0 6 | 3.6 7 | 4.2 8 | 4.8 9 | 5.4
861	500	505	510	515	520	526	531	536	541	546	
862	551	556	561	566	571	576	581	586	591	596	
863	601	606	611	616	621	626	631	636	641	646	
864	651	656	661	666	671	676	682	687	692	697	
865	702	707	712	717	722	727	732	737	742	747	
866	752	757	762	767	772	777	782	787	792	797	
867	802	807	812	817	822	827	832	837	842	847	
868	852	857	862	867	872	877	882	887	892	897	
869	902	907	912	917	922	927	932	937	942	947	
870	952	957	962	967	972	977	982	987	992	997	
871	94 002	007	012	017	022	027	032	037	042	047	5
872	052	057	062	067	072	077	082	086	091	096	1 | 0.5
873	101	106	111	116	121	126	131	136	141	146	2 | 1.0
874	151	156	161	166	171	176	181	186	191	196	3 | 1.5
875	201	206	211	216	221	226	231	236	240	245	4 | 2.0
876	250	255	260	265	270	275	280	285	290	295	5 | 2.5 6 | 3.0
877	300	305	310	315	320	325	330	335	340	345	7 | 3.5
878	349	354	359	364	369	374	379	384	389	394	8 | 4.0
879	399	404	409	414	419	424	429	433	438	443	9 | 4.5
880	448	453	458	463	468	473	478	483	488	493	
881	498	503	507	512	517	522	527	532	537	542	
882	547	552	557	562	567	571	576	581	586	591	
883	596	601	606	611	616	621	626	630	635	640	
884	645	650	655	660	665	670	675	680	685	689	
885	694	699	704	709	714	719	724	729	734	738	
886	743	748	753	758	763	768	773	778	783	787	
887	792	797	802	807	812	817	822	827	832	836	4
888	841	846	851	856	861	866	871	876	880	885	1 | 0.4
889	890	895	900	905	910	915	919	924	929	934	2 | 0.8 3 | 1.2
890	939	944	949	954	959	963	968	973	978	983	4 | 1.6 5 | 2.0
891	988	993	998	*002	*007	*012	*017	*022	*027	*032	6 | 2.4
892	95 036	041	046	051	056	061	066	071	075	080	7 | 2.8
893	085	090	095	100	105	109	114	119	124	129	8 | 3.2
894	134	139	143	148	153	158	163	168	173	177	9 | 3.6
895	182	187	192	197	202	207	211	216	221	226	
896	231	236	240	245	250	255	260	265	270	274	
897	279	284	289	294	299	303	308	313	318	323	
898	328	332	337	342	347	352	357	361	366	371	
899	376	381	386	390	395	400	405	410	415	419	
900	424	429	434	439	444	448	453	458	463	468	

N	L 0	1	2	3	4	5	6	7	8	9	P P

8460″	= 2° 21′	S	4.68 545	T	4.68 582	8760″	= 2° 26′	S	4.68 544	T	4.68 584
8520	= 2 22		4.68 545		4.68 582	8820	= 2 27		4.68 544		4.68 584
8580	= 2 23		4.68 545		4.68 583	8880	= 2 28		4.68 544		4.68 584
8640	= 2 24		4.68 545		4.68 583	8940	= 2 29		4.68 544		4.68 585
8700	= 2 25		4.68 545		4.68 583	9000	= 2 30		4.68 544		4.68 585

900—950

N	L 0	1	2	3	4	5	6	7	8	9	P P
900	95 424	429	434	439	444	448	453	458	463	468	
901	472	477	482	487	492	497	501	506	511	516	
902	521	525	530	535	540	545	550	554	559	564	
903	569	574	578	583	588	593	598	602	607	612	
904	617	622	626	631	636	641	646	650	655	660	
905	665	670	674	679	684	689	694	698	703	708	
906	713	718	722	727	732	737	742	746	751	756	
907	761	766	770	775	780	785	789	794	799	804	
908	809	813	818	823	828	832	837	842	847	852	
909	856	861	866	871	875	880	885	890	895	899	
910	904	909	914	918	923	928	933	938	942	947	
911	952	957	961	966	971	976	980	985	990	995	
912	999	*004	*009	*014	*019	*023	*028	*033	*038	*042	5
913	96 047	052	057	061	066	071	076	080	085	090	1 0.5
914	095	099	104	109	114	118	123	128	133	137	2 1.0
915	142	147	152	156	161	166	171	175	180	185	3 1.5
916	190	194	199	204	209	213	218	223	227	232	4 2.0
917	237	242	246	251	256	261	265	270	275	280	5 2.5
918	284	289	294	298	303	308	313	317	322	327	6 3.0
919	332	336	341	346	350	355	360	365	369	374	7 3.5
920	379	384	388	393	398	402	407	412	417	421	8 4.0
921	426	431	435	440	445	450	454	459	464	468	9 4.5
922	473	478	483	487	492	497	501	506	511	515	
923	520	525	530	534	539	544	548	553	558	562	
924	567	572	577	581	586	591	595	600	605	609	
925	614	619	624	628	633	638	642	647	652	656	
926	661	666	670	675	680	685	689	694	699	703	
927	708	713	717	722	727	731	736	741	745	750	
928	755	759	764	769	774	778	783	788	792	797	
929	802	806	811	816	820	825	830	834	839	844	
930	848	853	858	862	867	872	876	881	886	890	
931	895	900	904	909	914	918	923	928	932	937	
932	942	946	951	956	960	965	970	974	979	984	4
933	988	993	997	*002	*007	*011	*016	*021	*025	*030	1 0.4
934	97 035	039	044	049	053	058	063	067	072	077	2 0.8
935	081	086	090	095	100	104	109	114	118	123	3 1.2
936	128	132	137	142	146	151	155	160	165	169	4 1.6
937	174	179	183	188	192	197	202	206	211	216	5 2.0
938	220	225	230	234	239	243	248	253	257	262	6 2.4
939	267	271	276	280	285	290	294	299	304	308	7 2.8
940	313	317	322	327	331	336	340	345	350	354	8 3.2
941	359	364	368	373	377	382	387	391	396	400	9 3.6
942	405	410	414	419	424	428	433	437	442	447	
943	451	456	460	465	470	474	479	483	488	493	
944	497	502	506	511	516	520	525	529	534	539	
945	543	548	552	557	562	566	571	575	580	585	
946	589	594	598	603	607	612	617	621	626	630	
947	635	640	644	649	653	658	663	667	672	676	
948	681	685	690	695	699	704	708	713	717	722	
949	727	731	736	740	745	749	754	759	763	768	
950	772	777	782	786	791	795	800	804	809	813	

N	L 0	1	2	3	4	5	6	7	8	9	P P

9000″	=2° 30′	S	4.68 544	T	4.68 585	9300″	=2 35′	S	4.68 543	T	4.68 587
9060	=2 31		4.68 544		4.68 585	9360	=2 36		4.68 543		4.68 587
9120	=2 32		4.68 543		4.68 586	9420	=2 37		4.68 542		4.68 588
9180	=2 33		4.68 543		4.68 586	9480	=2 38		4.68 542		4.68 588
9240	=2 34		4.68 543		4.68 587	9540	=2 39		4.68 542		4.68 588

950—1000

N	L 0	1	2	3	4	5	6	7	8	9	P P
950	97 772	777	782	786	791	795	800	804	809	813	
951	818	823	827	832	836	841	845	850	855	859	
952	864	868	873	877	882	886	891	896	900	905	
953	909	914	918	923	928	932	937	941	946	950	
954	955	959	964	968	973	978	982	987	991	996	
955	98 000	005	009	014	019	023	028	032	037	041	
956	046	050	055	059	064	068	073	078	082	087	
957	091	096	100	105	109	114	118	123	127	132	
958	137	141	146	150	155	159	164	168	173	177	
959	182	186	191	195	200	204	209	214	218	223	
960	227	232	236	241	245	250	254	259	263	268	
961	272	277	281	286	290	295	299	304	308	313	5
962	318	322	327	331	336	340	345	349	354	358	1 | 0.5
963	363	367	372	376	381	385	390	394	399	403	2 | 1.0
964	408	412	417	421	426	430	435	439	444	448	3 | 1.5
965	453	457	462	466	471	475	480	484	489	493	4 | 2.0
966	498	502	507	511	516	520	525	529	534	538	5 | 2.5
967	543	547	552	556	561	565	570	574	579	583	6 | 3.0
968	588	592	597	601	605	610	614	619	623	628	7 | 3.5
969	632	637	641	646	650	655	659	664	668	673	8 | 4.0
970	677	682	686	691	695	700	704	709	713	717	9 | 4.5
971	722	726	731	735	740	744	749	753	758	762	
972	767	771	776	780	784	789	793	798	802	807	
973	811	816	820	825	829	834	838	843	847	851	
974	856	860	865	869	874	878	883	887	892	896	
975	900	905	909	914	918	923	927	932	936	941	
976	945	949	954	958	963	967	972	976	981	985	
977	989	994	998	*003	*007	*012	*016	*021	*025	*029	
978	99 034	038	043	047	052	056	061	065	069	074	
979	078	083	087	092	096	100	105	109	114	118	
980	123	127	131	136	140	145	149	154	158	162	
981	167	171	176	180	185	189	193	198	202	207	4
982	211	216	220	224	229	233	238	242	247	251	1 | 0.4
983	255	260	264	269	273	277	282	286	291	295	2 | 0.8
984	300	304	308	313	317	322	326	330	335	339	3 | 1.2
985	344	348	352	357	361	366	370	374	379	383	4 | 1.6
986	388	392	396	401	405	410	414	419	423	427	5 | 2.0
987	432	436	441	445	449	454	458	463	467	471	6 | 2.4
988	476	480	484	489	493	498	502	506	511	515	7 | 2.8
989	520	524	528	533	537	542	546	550	555	559	8 | 3.2
990	564	568	572	577	581	585	590	594	599	603	9 | 3.6
991	607	612	616	621	625	629	634	638	642	647	
992	651	656	660	664	669	673	677	682	686	691	
993	695	699	704	708	712	717	721	726	730	734	
994	739	743	747	752	756	760	765	769	774	778	
995	782	787	791	795	800	804	808	813	817	822	
996	826	830	835	839	843	848	852	856	861	865	
997	870	874	878	883	887	891	896	900	904	909	
998	913	917	922	926	930	935	939	944	948	952	
999	957	961	965	970	974	978	983	987	991	996	
1000	00 000	004	009	013	017	022	026	030	035	039	

N	L 0	1	2	3	4	5	6	7	8	9	P P

9480″	=2° 38′	S	4.68 542	T	4.68 588	9780″	=2° 43′	S	4.68 541	T	4.68 590
9540	=2 39		4.68 542		4.68 588	9840	=2 44		4.68 541		4.68 590
9600	=2 40		4.68 542		4.68 589	9900	=2 45		4.68 541		4.68 591
9660	=2 41		4.68 542		4.68 589	9960	=2 46		4.68 541		4.68 591
9720	=2 42		4.68 541		4.68 590	10020	=2 47		4.68 540		4.68 592

THE NATURAL LOGARITHMS

OF

WHOLE NUMBERS FROM 1 TO 200.

Common logarithms may be converted into natural logarithms by multiplying them by 2.3025850930.

Natural logarithms may be converted into common logarithms by multiplying them by 0.4342944819.

N	Nat Log	N	Nat Log	N	Nat Log	N	Nat Log	N	Nat Log
0	$-\infty$	40	3.68 888	80	4.38 203	120	4.78 749	160	5.07 517
1	0.00 000	41	3.71 357	81	4.39 445	121	4.79 579	161	5.08 140
2	0.69 315	42	3.73 767	82	4.40 672	122	4.80 402	162	5.08 760
3	1.09 861	43	3.76 120	83	4.41 884	123	4.81 218	163	5.09 375
4	1.38 629	44	3.78 419	84	4.43 082	124	4.82 028	164	5.09 987
5	1.60 944	45	3.80 666	85	4.44 265	125	4.82 831	165	5.10 595
6	1.79 176	46	3.82 864	86	4.45 435	126	4.83 628	166	5.11 199
7	1.94 591	47	3.85 015	87	4.46 591	127	4.84 419	167	5.11 799
8	2.07 944	48	3.87 120	88	4.47 734	128	4.85 203	168	5.12 396
9	2.19 722	49	3.89 182	89	4.48 864	129	4.85 981	169	5.12 990
10	2.30 259	50	3.91 202	90	4.49 981	130	4.86 753	170	5.13 580
11	2.39 790	51	3.93 183	91	4.51 086	131	4.87 520	171	5.14 166
12	2.48 491	52	3.95 124	92	4.52 179	132	4.88 280	172	5.14 749
13	2.56 495	53	3.97 029	93	4.53 260	133	4.89 035	173	5.15 329
14	2.63 906	54	3.98 898	94	4.54 329	134	4.89 784	174	5.15 906
15	2.70 805	55	4.00 733	95	4.55 388	135	4.90 527	175	5.16 479
16	2.77 259	56	4.02 535	96	4.56 435	136	4.91 265	176	5.17 048
17	2.83 321	57	4.04 305	97	4.57 471	137	4.91 998	177	5.17 615
18	2.89 037	58	4.06 044	98	4.58 497	138	4.92 725	178	5.18 178
19	2.94 444	59	4.07 754	99	4.59 512	139	4.93 447	179	5.18 739
20	2.99 573	60	4.09 434	100	4.60 517	140	4.94 164	180	5.19 296
21	3.04 452	61	4.11 087	101	4.61 512	141	4.94 876	181	5.19 850
22	3.09 104	62	4.12 713	102	4.62 497	142	4.95 583	182	5.20 401
23	3.13 549	63	4.14 313	103	4.63 473	143	4.96 284	183	5.20 949
24	3.17 805	64	4.15 888	104	4.64 439	144	4.96 981	184	5.21 494
25	3.21 888	65	4.17 439	105	4.65 396	145	4.97 673	185	5.22 036
26	3.25 810	66	4.18 965	106	4.66 344	146	4.98 361	186	5.22 575
27	3.29 584	67	4.20 469	107	4.67 283	147	4.99 043	187	5.23 111
28	3.33 220	68	4.21 951	108	4.68 213	148	4.99 721	188	5.23 644
29	3.36 730	69	4.23 411	109	4.69 135	149	5.00 395	189	5.24 175
30	3.40 120	70	4.24 850	110	4.70 048	150	5.01 064	190	5.24 702
31	3.43 399	71	4.26 268	111	4.70 953	151	5.01 728	191	5.25 227
32	3.46 574	72	4.27 667	112	4.71 850	152	5.02 388	192	5.25 750
33	3.49 651	73	4.29 046	113	4.72 739	153	5.03 044	193	5.26 269
34	3.52 636	74	4.30 407	114	4.73 620	154	5.03 695	194	5.26 786
35	3.55 535	75	4.31 749	115	4.74 493	155	5.04 343	195	5.27 300
36	3.58 352	76	4.33 073	116	4.75 359	156	5.04 986	196	5.27 811
37	3.61 092	77	4.34 381	117	4.76 217	157	5.05 625	197	5.28 320
38	3.63 759	78	4.35 671	118	4.77 068	158	5.06 260	198	5.28 827
39	3.66 356	79	4.36 945	119	4.77 912	159	5.06 890	199	5.29 330
40	3.68 888	80	4.38 203	120	4.78 749	160	5.07 517	200	5.29 832

II

TABLE OF ADDITION AND SUBTRACTION LOGARITHMS

FOR THE

CALCULATION OF THE LOGARITHMS

OF THE

SUM AND DIFFERENCE OF TWO NUMBERS WHOSE LOGARITHMS ARE GIVEN.

ADDITION.

A	B 0	1	2	3	4	5	6	7	8	9
0.00	0.30 103	053	003	*953	*903	*854	*804	*754	*705	*655
01	0.29 606	556	507	458	409	359	310	261	212	163
02	115	066	017	*968	*920	*871	*822	*774	*726	*677
03	0.28 629	581	532	484	436	388	340	292	245	197
04	149	101	054	006	*959	*911	*864	*817	*769	*722
05	0.27 675	628	581	534	487	440	393	346	300	253
06	207	160	114	067	021	*974	*928	*882	*836	*790
07	0.26 744	698	652	606	560	515	469	423	378	332
08	287	242	196	151	106	061	016	*970	*926	*881
09	0.25 836	791	746	701	657	612	568	523	479	434
0.10	390	346	302	258	214	170	126	082	038	*994
11	0.24 950	907	863	819	776	733	689	646	603	559
12	516	473	430	387	344	301	258	216	173	130
13	088	045	003	*960	*918	*875	*833	*791	*749	*707
14	0.23 665	623	581	539	497	455	414	372	330	289
15	247	206	165	123	082	041	000	*959	*918	*877
16	0.22 836	795	754	713	673	632	591	551	510	470
17	430	389	349	309	269	229	189	149	109	069
18	029	*989	*949	*910	*870	*831	*791	*752	*712	*673
19	0.21 634	595	556	516	477	438	399	361	322	283
0.20	244	206	167	128	090	052	013	*975	*937	*898
21	0.20 860	822	784	746	708	670	632	594	557	519
22	481	444	406	369	331	294	257	220	182	145
23	108	071	034	*997	*960	*923	*887	*850	*813	*777
24	0.19 740	704	667	631	595	558	522	486	450	414
25	378	342	306	270	234	198	163	127	091	056
26	020	*985	*949	*914	*879	*844	*808	*773	*738	*703
27	0.18 668	633	599	564	529	494	460	425	390	356
28	322	287	253	218	184	150	116	082	048	014
29	0.17 980	946	912	878	845	811	777	744	710	677
0.30	643	610	577	544	510	477	444	411	378	345
31	312	279	247	214	181	148	116	083	051	018
32	0.16 986	954	921	889	857	825	793	761	729	697
33	665	633	601	569	538	506	474	443	411	380
34	349	317	286	255	224	192	161	130	099	068
35	037	007	*976	*945	*914	*884	*853	*822	*792	*761
36	0.15 731	701	670	640	610	580	550	520	489	460
37	430	400	370	340	310	281	251	221	192	162
38	133	104	074	045	016	*986	*957	*928	*899	*870
39	0.14 841	812	783	755	726	697	668	640	611	583
0.40	554	526	497	469	441	412	384	356	328	300
41	272	244	216	188	160	132	104	077	049	021
42	0.13 994	966	939	911	884	857	829	802	775	748
43	721	694	667	640	613	586	559	532	505	479
44	452	425	399	372	346	319	293	267	240	214
45	188	162	136	110	084	058	032	006	*980	*954
46	0.12 928	903	877	851	826	800	775	749	724	698
47	673	648	622	597	572	547	522	497	472	447
48	422	397	372	348	323	298	274	249	224	200
49	175	151	127	102	078	054	030	005	*981	*957
0.50	0.11 933	909	885	861	837	814	790	766	742	719
A	B 0	1	2	3	4	5	6	7	8	9

P P

	50	49	48	47
1	5.0	4.9	4.8	4.7
2	10.0	9.8	9.6	9.4
3	15.0	14.7	14.4	14.1
4	20.0	19.6	19.2	18.8
5	25.0	24.5	24.0	23.5
6	30.0	29.4	28.8	28.2
7	35.0	34.3	33.6	32.9
8	40.0	39.2	38.4	37.6
9	45.0	44.1	43.2	42.3

	46	45	44	43
1	4.6	4.5	4.4	4.3
2	9.2	9.0	8.8	8.6
3	13.8	13.5	13.2	12.9
4	18.4	18.0	17.6	17.2
5	23.0	22.5	22.0	21.5
6	27.6	27.0	26.4	25.8
7	32.2	31.5	30.8	30.1
8	36.8	36.0	35.2	34.4
9	41.4	40.5	39.6	38.7

	42	41	40	39
1	4.2	4.1	4.0	3.9
2	8.4	8.2	8.0	7.8
3	12.6	12.3	12.0	11.7
4	16.8	16.4	16.0	15.6
5	21.0	20.5	20.0	19.5
6	25.2	24.6	24.0	23.4
7	29.4	28.7	28.0	27.3
8	33.6	32.8	32.0	31.2
9	37.8	36.9	36.0	35.1

	38	37	36	35
1	3.8	3.7	3.6	3.5
2	7.6	7.4	7.2	7.0
3	11.4	11.1	10.8	10.5
4	15.2	14.8	14.4	14.0
5	19.0	18.5	18.0	17.5
6	22.8	22.2	21.6	21.0
7	26.6	25.9	25.2	24.5
8	30.4	29.6	28.8	28.0
9	34.2	33.3	32.4	31.5

	34	33	32	31
1	3.4	3.3	3.2	3.1
2	6.8	6.6	6.4	6.2
3	10.2	9.9	9.6	9.3
4	13.6	13.2	12.8	12.4
5	17.0	16.5	16.0	15.5
6	20.4	19.8	19.2	18.6
7	23.8	23.1	22.4	21.7
8	27.2	26.4	25.6	24.8
9	30.6	29.7	28.8	27.9

$a > b$, $A = \log a - \log b$, $\log (a + b) = \log a + B$.

ADDITION.

A	B 0	1	2	3	4	5	6	7	8	9
0.50	0.11 933	909	885	861	837	814	790	766	742	719
51	69$\bar{5}$	671	648	624	601	577	554	531	507	484
52	461	438	41$\bar{5}$	392	368	345	323	300	277	254
53	231	208	186	163	140	118	095	073	050	028
54	005	*983	*960	*938	*916	*894	*872	*849	*827	*805
55	0.10 783	761	739	718	696	674	652	630	609	587
56	565	544	522	501	479	458	437	415	394	373
57	351	330	309	288	267	246	22$\bar{5}$	204	183	162
58	141	120	100	079	058	038	017	*996	*976	*955
59	0.09 93$\bar{5}$	914	894	874	853	833	813	793	773	752
0.60	732	712	692	672	652	632	612	593	573	553
61	533	514	494	474	45$\bar{5}$	435	416	396	377	357
62	338	319	299	280	261	242	223	204	184	165
63	146	127	108	090	071	052	033	014	*996	*977
64	0.08 958	940	921	902	884	865	847	829	810	792
65	774	755	737	719	701	683	664	646	628	610
66	592	574	557	539	521	503	485	468	45$\bar{0}$	432
67	41$\bar{5}$	397	379	362	344	327	309	292	27$\bar{5}$	257
68	240	223	206	188	171	154	137	120	103	086
69	069	052	035	018	001	*98$\bar{5}$	*968	*951	*934	*918
0.70	0.07 901	884	868	851	83$\bar{5}$	818	802	785	769	753
71	736	720	704	687	671	655	639	623	607	591
72	57$\bar{5}$	559	543	527	511	49$\bar{5}$	479	463	448	432
73	416	400	38$\bar{5}$	369	354	338	322	307	291	276
74	261	245	230	21$\bar{5}$	199	184	169	154	138	123
75	108	093	078	063	048	033	018	003	*988	*973
76	0.06 959	944	929	914	900	885	870	856	841	827
77	812	798	783	769	754	740	725	711	697	683
78	668	654	640	626	612	597	583	569	555	541
79	527	513	5$\bar{0}$0	486	472	458	444	430	417	403
0.80	389	376	362	348	33$\bar{5}$	321	308	294	281	267
81	254	240	227	214	200	187	174	161	147	134
82	121	108	09$\bar{5}$	082	069	056	043	030	017	004
83	0.05 991	978	965	952	939	927	914	901	889	876
84	863	851	838	825	813	800	788	775	763	751
85	738	726	714	701	689	677	664	652	640	628
86	616	604	591	579	567	555	543	531	519	508
87	496	484	472	460	448	436	42$\bar{5}$	413	401	390
88	378	366	35$\bar{5}$	343	332	320	308	297	286	274
89	263	251	240	229	217	206	19$\bar{5}$	183	172	161
0.90	1$\bar{5}$0	139	127	116	105	094	083	072	061	050
91	039	028	017	006	*995	*98$\bar{5}$	*974	*963	*952	*941
92	0.04 931	920	909	898	888	877	867	856	845	83$\bar{5}$
93	824	814	803	793	782	772	762	751	741	731
94	720	710	700	689	679	669	659	649	639	628
95	618	608	598	588	578	568	558	548	538	528
96	519	509	499	489	479	469	460	45$\bar{0}$	440	430
97	421	411	401	392	382	373	363	353	344	334
98	32$\bar{5}$	315	306	297	287	278	268	259	25$\bar{0}$	240
99	231	222	213	203	194	18$\bar{5}$	176	167	157	148
1.00	139	130	121	112	103	094	085	076	067	058
A	B 0	1	2	3	4	5	6	7	8	9

P	P			
	30	29	28	27
1	3.0	2.9	2.8	2.7
2	6.0	5.8	5.6	5.4
3	9.0	8.7	8.4	8.1
4	12.0	11.6	11.2	10.8
5	15.0	14.5	14.0	13.5
6	18.0	17.4	16.8	16.2
7	21.0	20.3	19.6	18.9
8	24.0	23.2	22.4	21.6
9	27.0	26.1	25.2	24.3

P	P			
	26	25	24	23
1	2.6	2.5	2.4	2.3
2	5.2	5.0	4.8	4.6
3	7.8	7.5	7.2	6.9
4	10.4	10.0	9.6	9.2
5	13.0	12.5	12.0	11.5
6	15.6	15.0	14.4	13.8
7	18.2	17.5	16.8	16.1
8	20.8	20.0	19.2	18.4
9	23.4	22.5	21.6	20.7

P	P			
	22	21	19	18
1	2.2	2.1	1.9	1.8
2	4.4	4.2	3.8	3.6
3	6.6	6.3	5.7	5.4
4	8.8	8.4	7.6	7.2
5	11.0	10.5	9.5	9.0
6	13.2	12.6	11.4	10.8
7	15.4	14.7	13.3	12.6
8	17.6	16.8	15.2	14.4
9	19.8	18.9	17.1	16.2

P	P			
	17	16	15	14
1	1.7	1.6	1.5	1.4
2	3.4	3.2	3.0	2.8
3	5.1	4.8	4.5	4.2
4	6.8	6.4	6.0	5.6
5	8.5	8.0	7.5	7.0
6	10.2	9.6	9.0	8.4
7	11.9	11.2	10.5	9.8
8	13.6	12.8	12.0	11.2
9	15.3	14.4	13.5	12.6

P	P			
	13	12	11	9
1	1.3	1.2	1.1	0.9
2	2.6	2.4	2.2	1.8
3	3.9	3.6	3.3	2.7
4	5.2	4.8	4.4	3.6
5	6.5	6.0	5.5	4.5
6	7.8	7.2	6.6	5.4
7	9.1	8.4	7.7	6.3
8	10.4	9.6	8.8	7.2
9	11.7	10.8	9.9	8.1

$a > b, \quad A = \log a - \log b, \quad \log (a+b) = \log a + B.$

ADDITION.

A	B 0	1	2	3	4	5	6	7	8	9
1.00	0.04 139	130	121	112	103	094	085	076	067	058
01	049	040	032	023	014	005	*996	*987	*979	*970
02	0.03 961	953	944	935	926	918	909	901	892	883
03	875	866	858	849	841	832	824	816	807	799
04	790	782	774	765	757	749	741	732	724	716
05	708	700	691	683	675	667	659	651	643	635
06	627	619	611	603	595	587	579	571	563	555
07	548	540	532	524	516	509	501	493	485	478
08	470	462	455	447	439	432	424	417	409	401
09	394	386	379	371	364	357	349	342	334	327
1.10	320	312	305	298	290	283	276	268	261	254
11	247	240	232	225	218	211	204	197	190	183
12	175	168	161	154	147	140	133	126	120	113
13	106	099	092	085	078	071	065	058	051	044
14	037	031	024	017	011	004	*997	*991	*984	*977
15	0.02 971	964	957	951	944	938	931	925	918	912
16	905	899	892	886	879	873	867	860	854	848
17	841	835	829	822	816	810	803	797	791	785
18	779	772	766	760	754	748	742	735	729	723
19	717	711	705	699	693	687	681	675	669	663
1.20	657	651	645	639	634	628	622	616	610	604
21	599	593	587	581	575	570	564	558	552	547
22	541	535	530	524	518	513	507	502	496	490
23	485	479	474	468	463	457	452	446	441	435
24	430	424	419	414	408	403	397	392	387	381
25	376	371	365	360	355	350	344	339	334	329
26	323	318	313	308	303	297	292	287	282	277
27	272	267	262	257	252	246	241	236	231	226
28	221	216	211	207	202	197	192	187	182	177
29	172	167	162	158	153	148	143	138	133	129
1.30	124	119	114	110	105	100	095	091	086	081
31	077	072	067	063	058	053	049	044	040	035
32	030	026	021	017	012	008	003	*999	*994	*990
33	0.01 985	981	976	972	967	963	959	954	950	945
34	941	937	932	928	924	919	915	911	906	902
35	898	894	889	885	881	877	872	868	864	860
36	856	851	847	843	839	835	831	827	822	818
37	814	810	806	802	798	794	790	786	782	778
38	774	770	766	762	758	754	750	746	742	738
39	734	730	726	722	719	715	711	707	703	699
1.40	695	692	688	684	680	676	673	669	665	661
41	658	654	650	646	643	639	635	632	628	624
42	621	617	613	610	606	602	599	595	591	588
43	584	581	577	574	570	566	563	559	556	552
44	549	545	542	538	535	531	528	525	521	518
45	514	511	507	504	501	497	494	490	487	484
46	480	477	474	470	467	464	460	457	454	450
47	447	444	441	437	434	431	428	424	421	418
48	415	412	408	405	402	399	396	393	389	386
49	383	380	377	374	371	368	364	361	358	355
1.50	0.01 352	349	346	343	340	337	334	331	328	325
A	B 0	1	2	3	4	5	6	7	8	9

P	P
	9
1	0.9
2	1.8
3	2.7
4	3.6
5	4.5
6	5.4
7	6.3
8	7.2
9	8.1

P	8	7
1	0.8	0.7
2	1.6	1.4
3	2.4	2.1
4	3.2	2.8
5	4.0	3.5
6	4.8	4.2
7	5.6	4.8
8	6.4	5.6
9	7.2	6.3

P	6
1	0.6
2	1.2
3	1.8
4	2.4
5	3.0
6	3.6
7	4.2
8	4.8
9	5.4

P	5	4
1	0.5	0.4
2	1.0	0.8
3	1.5	1.2
4	2.0	1.6
5	2.5	2.0
6	3.0	2.4
7	3.5	2.8
8	4.0	3.2
9	4.5	3.6

P	3
1	0.3
2	0.6
3	0.9
4	1.2
5	1.5
6	1.8
7	2.1
8	2.4
9	2.7

P	P

$a > b, \qquad A = \log a - \log b, \qquad \log(a+b) = \log a + B.$

ADDITION.

A	B 0	1	2	3	4	5	6	7	8	9
1.50	0.01 352	349	346	343	340	337	334	331	328	325
51	322	319	316	313	310	307	304	301	298	295
52	292	289	286	283	280	278	275	272	269	266
53	263	260	257	255	252	249	246	243	240	238
54	235	232	229	226	224	221	218	215	213	210
55	207	204	202	199	196	193	191	188	185	183
56	180	177	175	172	169	167	164	161	159	156
57	153	151	148	146	143	140	138	135	133	130
58	128	125	122	120	117	115	112	110	107	105
59	102	100	097	095	092	090	087	085	082	080
1.60	0.01 077	075	073	070	068	065	063	060	058	056
61	053	051	048	046	044	041	039	037	034	032
62	030	027	025	022	020	018	016	013	011	009
63	006	004	002	*999	*997	*995	*993	*990	*988	*986
64	0.00 984	981	979	977	975	973	970	968	966	964
65	962	959	957	955	953	951	948	946	944	942
66	940	938	936	933	931	929	927	925	923	921
67	919	917	915	912	910	908	906	904	902	900
68	898	896	894	892	890	888	886	884	882	880
69	878	876	874	872	870	868	866	864	862	860
1.70	0.00 858	856	854	852	850	848	846	844	842	841
71	839	837	835	833	831	829	827	825	823	822
72	820	818	816	814	812	810	809	807	805	803
73	801	799	798	796	794	792	790	789	787	785
74	783	781	780	778	776	774	773	771	769	767
75	766	764	762	760	759	757	755	753	752	750
76	748	747	745	743	741	740	738	736	735	733
77	731	730	728	726	725	723	721	720	718	716
78	715	713	712	710	708	707	705	703	702	700
79	699	697	696	694	692	691	689	688	686	684
1.80	0.00 683	681	680	678	677	675	674	672	671	669
81	667	666	664	663	661	660	658	657	655	654
82	652	651	649	648	646	645	644	642	641	639
83	638	636	635	633	632	630	629	628	626	625
84	623	622	620	619	618	616	615	613	612	611
85	609	608	606	605	604	602	601	599	598	597
86	595	594	593	591	590	589	587	586	585	583
87	582	581	579	578	577	575	574	573	571	570
88	569	567	566	565	564	562	561	560	558	557
89	556	555	553	552	551	550	548	547	546	545
1.90	0.00 543	542	541	540	538	537	536	535	533	532
91	531	530	529	527	526	525	524	523	521	520
92	519	518	517	515	514	513	512	511	510	508
93	507	506	505	504	503	502	500	499	498	497
94	496	495	494	492	491	490	489	488	487	486
95	485	483	482	481	480	479	478	477	476	475
96	474	473	471	470	469	468	467	466	465	464
97	463	462	461	460	459	458	457	456	454	453
98	452	451	450	449	448	447	446	445	444	443
99	442	441	440	439	438	437	436	435	434	433
2.00	0.00 432	431	430	429	428	427	426	425	424	423

P	P
	3
1	0.3
2	0.6
3	0.9
4	1.2
5	1.5
6	1.8
7	2.1
8	2.4
9	2.7

A B 0 1 2 3 4 5 6 7 8 9 P P

$a > b, \quad A = \log a - \log b, \quad \log\,(a+b) = \log a + B.$

ADDITION.

A	B 0	1	2	3	4	5	6	7	8	9
2.0	0.00 432	422	413	403	394	385	377	368	360	352
1	344	336	328	321	313	306	299	293	286	280
2	273	267	261	255	249	244	238	233	227	222
3	217	212	207	203	198	194	189	185	181	177
4	173	169	165	161	157	154	150	147	144	140
5	137	134	131	128	125	122	119	117	114	111
6	109	106	104	102	099	097	095	093	091	089
7	087	085	083	081	079	077	075	074	072	070
8	069	067	066	064	063	061	060	059	057	056
9	055	053	052	051	050	049	048	047	045	044
3.0	0.00 043	042	041	041	040	039	038	037	036	035
1	034	034	033	032	031	031	030	029	029	028
2	027	027	026	026	025	024	024	023	023	022
3	022	021	021	020	020	019	019	019	018	018
4	017	017	017	016	016	015	015	015	014	014
5	014	013	013	013	013	012	012	012	011	011
6	011	011	010	010	010	010	010	009	009	009
7	009	008	008	008	008	008	008	007	007	007
8	007	007	007	006	006	006	006	006	006	006
9	005	005	005	005	005	005	005	005	005	004
4.0	0.00 004	004	004	004	004	004	004	004	004	004
1	003	003	003	003	003	003	003	003	003	003
2	003	003	003	003	002	002	002	002	002	002
3	002	002	002	002	002	002	002	002	002	002
4	002	002	002	002	002	002	002	001	001	001
5	001	001	001	001	001	001	001	001	001	001
6	001	001	001	001	001	001	001	001	001	001
7	001	001	001	001	001	001	001	001	001	001
8	001	001	001	001	001	001	001	001	001	001
9	001	001	001	001	000	000	000	000	000	000
5.0	0.00 000	000	000	000	000	000	000	000	000	000
A	B 0	1	2	3	4	5	6	7	8	9

P	P	
	9	8
1	0.9	0.8
2	1.8	1.6
3	2.7	2.4
4	3.6	3.2
5	4.5	4.0
6	5.4	4.8
7	6.3	5.6
8	7.2	6.4
9	8.1	7.2

P	P		
	7	6	5
1	0.7	0.6	0.5
2	1.4	1.2	1.0
3	2.1	1.8	1.5
4	2.8	2.4	2.0
5	3.5	3.0	2.5
6	4.2	3.6	3.0
7	4.9	4.2	3.5
8	5.6	4.8	4.0
9	6.3	5.4	4.5

P	P	
	4	3
1	0.4	0.3
2	0.8	0.6
3	1.2	0.9
4	1.6	1.2
5	2.0	1.5
6	2.4	1.8
7	2.8	2.1
8	3.2	2.4
9	3.6	2.7

$a > b, \qquad A = \log a - \log b, \qquad \log(a+b) = \log a + B.$

The above table of Addition Logarithms is based on the identity

$$\log(a+b) = \log a\left(1+\frac{b}{a}\right)$$

$$= \log a + \log\left(1+\frac{1}{\frac{a}{b}}\right).$$

The argument A is $\log \frac{a}{b}$, and the function B is $\log\left(1+\frac{1}{\frac{a}{b}}\right)$, consequently

$$\log(a+b) = \log a + B.$$

SUBTRACTION.

A	B 0	1	2	3	4	5	6	7	8	9	P P
0.300	0.30 206	196	186	176	166	156	146	136	126	116	
301	106	096	086	076	066	056	046	036	026	016	
302	006	*996	*986	*976	*966	*956	*947	*937	*927	*917	
303	0.29 907	897	887	877	867	857	848	838	828	818	
304	808	798	788	778	769	759	749	739	729	719	
305	710	700	690	680	670	661	651	641	631	621	
306	612	602	592	582	573	563	553	543	534	524	
307	514	504	495	485	475	465	456	446	436	427	
308	417	407	398	388	378	369	359	349	340	330	
309	320	311	301	291	282	272	263	253	243	234	
0.310	224	215	205	195	186	176	167	157	147	138	
311	128	119	109	100	090	081	071	062	052	043	
312	033	024	014	005	*995	*986	*976	*967	*957	*948	9
313	0.28 938	929	919	910	900	891	881	872	862	853	1 | 0.9
314	844	834	825	815	806	797	787	778	768	759	2 | 1.8
315	750	740	731	721	712	703	693	684	675	665	3 | 2.7
316	656	647	637	628	619	609	600	591	581	572	4 | 3.6
317	563	553	544	535	525	516	507	498	488	479	5 | 4.5
318	470	461	451	442	433	424	414	405	396	387	6 | 5.4
319	377	368	359	350	341	331	322	313	304	295	7 | 6.3
0.320	285	276	267	258	249	240	230	221	212	203	8 | 7.2 9 | 8.1
321	194	185	176	166	157	148	139	130	121	112	
322	103	094	084	075	066	057	048	039	030	021	
323	012	003	*994	*985	*976	*967	*958	*948	*939	*930	
324	0.27 921	912	903	894	885	876	867	858	849	840	
325	831	822	813	804	796	787	778	769	760	751	
326	742	733	724	715	706	697	688	679	670	661	
327	653	644	635	626	617	608	599	590	581	573	
328	564	555	546	537	528	519	511	502	493	484	
329	475	466	458	449	440	431	422	414	405	396	
0.330	387	378	370	361	352	343	335	326	317	308	
331	300	291	282	273	265	256	247	238	230	221	8
332	212	204	195	186	177	169	160	151	143	134	1 | 0.8
333	125	117	108	099	091	082	073	065	056	047	2 | 1.6
334	039	030	021	013	004	*996	*987	*978	*970	*961	3 | 2.4
335	0.26 953	944	935	927	918	910	901	892	884	875	4 | 3.2
336	867	858	850	841	832	824	815	807	798	790	5 | 4.0
337	781	773	764	756	747	739	730	722	713	705	6 | 4.8
338	696	688	679	671	662	654	645	637	628	620	7 | 5.6
339	611	603	595	586	578	569	561	552	544	535	8 | 6.4 9 | 7.2
0.340	527	519	510	502	493	485	477	468	460	451	
341	443	435	426	418	410	401	393	384	376	368	
342	359	351	343	334	326	318	309	301	293	284	
343	276	268	259	251	243	235	226	218	210	201	
344	193	185	177	168	160	152	144	135	127	119	
345	111	102	094	086	078	069	061	053	045	036	
346	028	020	012	004	*995	*987	*979	*971	*963	*955	
347	0.25 946	938	930	922	914	906	897	889	881	873	
348	865	857	849	840	832	824	816	808	800	792	
349	784	775	767	759	751	743	735	727	719	711	
0.350	0.25 703	695	687	678	670	662	654	646	638	630	
A	B 0	1	2	3	4	5	6	7	8	9	P P

$a > b$. Put $x = \log a - \log b$.

If $x > .3$, then $x = A$ and $\log (a - b) = \log a - B$.

If $x < .3$, then $x = B$ and $\log (a - b) = \log a - A$.

SUBTRACTION.

A	B 0	1	2	3	4	5	6	7	8	9	P	P
0.350	0.25 703	69$\bar{5}$	687	678	670	662	654	646	638	630		
351	622	614	606	598	590	582	574	566	558	55$\bar{0}$		
352	542	534	526	518	510	502	494	486	478	470		
353	462	454	446	438	430	422	414	406	398	390		
354	382	374	367	359	351	343	33$\bar{5}$	327	319	311		9
355	303	295	287	279	272	264	256	248	240	232	1	0.9
356	224	216	209	201	193	18$\bar{5}$	177	169	161	154	2	1.8
357	146	138	130	122	114	106	099	091	083	075	3	2.7
358	067	060	052	044	036	028	021	013	005	*997	4	3.6
359	0.24 989	982	974	966	958	951	943	935	927	920	5	4.5
0.360	912	904	896	889	881	873	865	858	850	842	6	5.4
361	83$\bar{5}$	827	819	811	804	796	788	781	773	765	7	6.3
362	758	75$\bar{0}$	742	734	727	719	711	704	696	688	8	7.2
363	681	673	666	658	650	643	63$\bar{5}$	627	620	612	9	8.1
364	604	597	589	582	574	566	559	551	544	536		
365	528	521	513	506	498	490	483	475	468	460		
366	453	445	438	430	422	41$\bar{5}$	407	400	392	38$\bar{5}$		8
367	377	370	362	35$\bar{5}$	347	340	332	32$\bar{5}$	317	310	1	0.8
368	302	29$\bar{5}$	287	280	272	26$\bar{5}$	257	25$\bar{0}$	242	23$\bar{5}$	2	1.6
369	227	220	212	20$\bar{5}$	197	190	182	175	168	160	3	2.4
0.370	153	145	138	130	123	116	108	101	093	086	4	3.2
371	078	071	064	056	049	041	034	027	019	012	5	4.0
372	004	*997	*990	*982	*97$\bar{5}$	*968	*960	*953	*946	*938	6	4.8
373	0.23 931	923	916	909	901	894	887	879	872	86$\bar{5}$	7	5.6
374	857	850	843	836	828	821	814	806	799	792	8	6.4
375	784	777	770	763	755	748	741	733	726	719	9	7.2
376	712	704	697	690	683	675	668	661	654	646		
377	639	632	62$\bar{5}$	617	610	603	596	589	581	574		
378	567	560	553	545	538	531	524	517	509	502		7
379	495	488	481	474	466	459	452	44$\bar{5}$	438	431	1	0.7
0.380	423	416	409	402	39$\bar{5}$	388	381	373	366	359	2	1.4
381	352	34$\bar{5}$	338	331	324	317	309	302	295	288	3	2.1
382	281	274	267	260	253	246	23$\bar{8}$	231	224	217	4	2.8
383	210	203	196	189	182	17$\bar{5}$	168	161	154	147	5	3.5
384	140	133	126	119	112	10$\bar{5}$	098	091	083	076	6	4.2
385	069	062	055	048	041	034	027	020	013	006	7	4.9
386	000	*993	*986	*979	*972	*96$\bar{5}$	*958	*951	*944	*937	8	5.6
387	0.22 930	923	916	909	902	895	888	881	874	867	9	6.3
388	860	853	847	840	833	826	819	812	805	798		
389	791	784	777	771	764	757	75$\bar{0}$	743	736	729		
0.390	722	716	709	702	69$\bar{5}$	688	681	674	667	661		6
391	654	647	640	633	626	620	613	606	599	592	1	0.6
392	585	579	572	56$\bar{5}$	558	55$\bar{1}$	54$\bar{5}$	538	531	524	2	1.2
393	517	511	504	497	490	483	477	470	463	456	3	1.8
394	45$\bar{0}$	443	436	429	422	416	409	402	395	389	4	2.4
395	382	375	369	362	355	348	342	33$\bar{5}$	328	321	5	3.0
396	31$\bar{5}$	308	301	29$\bar{5}$	288	281	274	268	261	254	6	3.6
397	248	241	234	228	221	214	208	201	194	188	7	4.2
398	181	174	168	161	154	148	141	134	128	121	8	4.8
399	114	108	101	094	088	081	07$\bar{5}$	068	061	05$\bar{5}$	9	5.4
0.400	0.22 048	041	035	028	022	015	008	002	*995	*989		
A	B 0	1	2	3	4	5	6	7	8	9	P	P

$a > b$. Put $x = \log a - \log b$.

If $x > .3$, then $x = A$ and $\log (a - b) = \log a - B$.

If $x < .3$, then $x = B$ and $\log (a - b) = \log a - A$.

SUBTRACTION.

A	B 0	1	2	3	4	5	6	7	8	9	P P
0.400	0.22 048	041	035	028	022	015	008	002	*995	*989	
401	0.21 982	975	969	962	956	949	943	936	929	923	
402	916	910	903	897	890	884	877	870	864	857	
403	851	844	838	831	825	818	812	805	799	792	
404	786	779	772	766	759	753	746	740	733	727	
405	721	714	708	701	695	688	682	675	669	662	
406	656	649	643	636	630	623	617	611	604	598	
407	591	585	578	572	565	559	553	546	540	533	
408	527	521	514	508	501	495	488	482	476	469	7
409	463	456	450	444	437	431	425	418	412	405	1 | 0.7
0.410	399	393	386	380	374	367	361	355	348	342	2 | 1.4 3 | 2.1 4 | 2.8
411	336	329	323	317	310	304	298	291	285	279	5 | 3.5
412	272	266	260	253	247	241	234	228	222	215	6 | 4.2
413	209	203	197	190	184	178	171	165	159	153	7 | 4.9
414	146	140	134	127	121	115	109	102	096	090	8 | 5.6
415	084	077	071	065	059	052	046	040	034	028	9 | 6.3
416	021	015	009	003	*996	*990	*984	*978	*972	*965	
417	0.20 959	953	947	941	934	928	922	916	910	903	
418	897	891	885	879	873	866	860	854	848	842	
419	836	829	823	817	811	805	799	793	786	780	
0.420	774	768	762	756	750	743	737	731	725	719	
421	713	707	701	695	688	682	676	670	664	658	
422	652	646	640	634	628	621	615	609	603	597	6
423	591	585	579	573	567	561	555	549	543	537	1 | 0.6
424	531	525	518	512	506	500	494	488	482	476	2 | 1.2
425	470	464	458	452	446	440	434	428	422	416	3 | 1.8
426	410	404	398	392	386	380	374	368	362	356	4 | 2.4
427	350	344	338	332	326	320	314	308	302	297	5 | 3.0
428	291	285	279	273	267	261	255	249	243	237	6 | 3.6
429	231	225	219	213	207	201	196	190	184	178	7 | 4.2 8 | 4.8
0.430	172	166	160	154	148	142	136	131	125	119	9 | 5.4
431	113	107	101	095	089	083	078	072	066	060	
432	054	048	042	037	031	025	019	013	007	001	
433	0.19 996	990	984	978	972	966	960	955	949	943	
434	937	931	926	920	914	908	902	896	891	885	
435	879	873	867	862	856	850	844	838	833	827	5
436	821	815	809	804	798	792	786	781	775	769	1 | 0.5
437	763	758	752	746	740	735	729	723	717	712	2 | 1.0
438	706	700	694	689	683	677	671	666	660	654	3 | 1.5
439	648	643	637	631	626	620	614	608	603	597	4 | 2.0 5 | 2.5
0.440	591	586	580	574	569	563	557	552	546	540	6 | 3.0 7 | 3.5
441	534	529	523	517	512	506	500	495	489	483	8 | 4.0
442	478	472	466	461	455	450	444	438	433	427	9 | 4.5
443	421	416	410	404	399	393	387	382	376	371	
444	365	359	354	348	343	337	331	326	320	315	
445	309	303	298	292	297	281	275	270	264	259	
446	253	247	242	236	231	225	220	214	208	203	
447	197	192	186	181	175	170	164	158	153	147	
448	142	136	131	125	120	114	109	103	098	092	
449	087	081	076	070	064	059	053	048	042	037	
0.450	0.19 031	026	020	015	009	004	*999	*993	*988	*982	
A	B 0	1	2	3	4	5	6	7	8	9	P P

$a > b$. Put $x = \log a - \log b$.

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SUBTRACTION.

A	B 0	1	2	3	4	5	6	7	8	9	P P
0.450	0.19 031	026	020	015	009	004	*999	*993	*988	*982	
451	0.18 977	971	966	960	955	949	944	938	933	927	
452	922	916	911	905	900	895	889	884	878	873	
453	867	862	856	851	846	840	835	829	824	818	
454	813	808	802	797	791	786	781	775	770	764	
455	759	754	748	743	737	732	727	721	716	710	
456	705	700	694	689	683	678	673	667	662	657	6
457	651	646	641	635	630	624	619	614	608	603	1 | 0.6
458	598	592	587	582	576	571	566	560	555	550	2 | 1.2
459	544	539	534	528	523	518	512	507	502	496	3 | 1.8
0.460	491	486	481	475	470	465	459	454	449	443	4 | 2.4
461	438	433	428	422	417	412	406	401	396	391	5 | 3.0
462	385	380	375	370	364	359	354	349	343	338	6 | 3.6
463	333	328	322	317	312	307	301	296	291	286	7 | 4.2
464	280	275	270	265	259	254	249	244	239	233	8 | 4.8
465	228	223	218	212	207	202	197	192	186	181	9 | 5.4
466	176	171	166	160	155	150	145	140	135	129	
467	124	119	114	109	103	098	093	088	083	078	
468	072	067	062	057	052	047	042	036	031	026	
469	021	016	011	006	000	*995	*990	*985	*980	*975	
0.470	0.17 970	964	959	954	949	944	939	934	929	924	
471	918	913	908	903	898	893	888	883	878	873	5
472	867	862	857	852	847	842	837	832	827	822	1 | 0.5
473	817	812	807	801	796	791	786	781	776	771	2 | 1.0
474	766	761	756	751	746	741	736	731	726	721	3 | 1.5
475	716	711	706	700	695	690	685	680	675	670	4 | 2.0
476	665	660	655	650	645	640	635	630	625	620	5 | 2.5
477	615	610	605	600	595	590	585	580	575	570	6 | 3.0
478	565	560	555	550	545	540	535	530	525	520	7 | 3.5
479	515	511	506	501	496	491	486	481	476	471	8 | 4.0
0.480	466	461	456	451	446	441	436	431	426	421	9 | 4.5
481	416	412	407	402	397	392	387	382	377	372	
482	367	362	357	352	348	343	338	333	328	323	
483	318	313	308	303	299	294	289	284	279	274	
484	269	264	259	255	250	245	240	235	230	225	
485	220	216	211	206	201	196	191	186	182	177	
486	172	167	162	157	153	148	143	138	133	128	4
487	123	119	114	109	104	099	095	090	085	080	1 | 0.4
488	075	070	066	061	056	051	046	042	037	032	2 | 0.8
489	027	022	018	013	008	003	*998	*994	*989	*984	3 | 1.2
0.490	0.16 979	974	970	965	960	955	951	946	941	936	4 | 1.6
491	931	927	922	917	912	908	903	898	893	889	5 | 2.0
492	884	879	874	870	865	860	855	851	846	841	6 | 2.4
493	836	832	827	822	818	813	808	803	799	794	7 | 2.8
494	789	784	780	775	770	766	761	756	751	747	8 | 3.2
495	742	737	733	728	723	719	714	709	704	700	9 | 3.6
496	695	690	686	681	676	672	667	662	658	653	
497	648	644	639	634	630	625	620	616	611	606	
498	602	597	592	588	583	578	574	569	564	560	
499	555	551	546	541	537	532	527	523	518	513	
0.500	0.16 509	504	500	495	490	486	481	477	472	467	
A	B 0	1	2	3	4	5	6	7	8	9	P P

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SUBTRACTION.

A	B 0	1	2	3	4	5	6	7	8	9
0.50	0.16 509	463	417	371	325	280	234	189	144	099
51	054	009	*963	*921	*876	*832	*788	*745	*701	*057
52	0.15 614	571	528	485	442	400	357	315	273	230
53	189	147	105	064	022	*981	*940	*899	*858	*817
54	0.14 777	736	696	656	616	576	536	496	457	417
55	378	339	300	261	222	183	145	106	068	030
56	0.13 992	954	916	878	840	803	766	728	691	654
57	617	581	544	507	471	435	398	362	326	291
58	255	219	184	148	113	078	043	008	*973	*938
59	0.12 903	869	834	800	766	732	698	664	630	596
0.60	563	529	496	463	429	396	363	330	298	265
61	232	200	168	135	103	071	039	007	*975	*944
62	0.11 912	880	849	818	786	755	724	693	663	632
63	601	571	540	510	479	449	419	389	359	329
64	299	270	240	211	181	152	123	094	065	036
65	007	*978	*949	*921	*892	*864	*835	*807	*779	*750
66	0.10 722	694	667	639	611	583	556	528	501	474
67	446	419	392	365	338	312	285	258	231	205
68	178	152	126	100	073	047	021	*995	*970	*944
69	0.09 918	893	867	842	816	791	766	740	715	690
0.70	665	640	616	591	566	542	517	493	468	444
71	420	395	371	347	323	299	275	252	228	204
72	181	157	134	110	087	064	041	018	*995	*972
73	0.08 949	926	903	880	858	835	813	790	768	745
74	723	701	679	657	635	613	591	569	547	525
75	504	482	461	439	418	396	375	354	333	311
76	290	269	248	228	207	186	165	145	124	103
77	083	063	042	022	002	*981	*961	*941	*921	*901
78	0.07 881	861	842	822	802	782	763	743	724	704
79	685	666	646	627	608	589	570	551	532	513
0.80	494	475	456	438	419	401	382	363	345	327
81	308	290	272	253	235	217	199	181	163	145
82	127	110	092	074	056	039	021	004	*986	*969
83	0.06 951	934	917	900	882	865	848	831	814	797
84	780	763	747	730	713	696	680	663	647	630
85	614	597	581	564	548	532	516	499	483	467
86	451	435	419	403	387	372	356	340	324	309
87	293	278	262	247	231	216	200	185	170	155
88	139	124	109	094	079	064	049	034	019	004
89	0.05 989	975	960	945	931	916	901	887	872	858
0.90	844	829	815	800	786	772	758	744	730	715
91	701	687	673	659	646	632	618	604	590	577
92	563	549	536	522	509	495	482	468	455	441
93	428	415	401	388	375	362	349	336	323	310
94	297	284	271	258	245	232	219	207	194	181
95	169	156	143	131	118	106	093	081	069	056
96	044	032	019	007	*995	*983	*970	*958	*946	*934
97	0.04 922	910	898	886	874	863	851	839	827	815
98	804	792	780	769	757	746	734	723	711	700
99	688	677	666	654	643	632	620	609	598	587
1.00	0.04 576	565	554	543	532	521	510	499	488	477

A	B 0	1	2	3	4	5	6	7	8	9

P	P			
	46	45	44	43
1	4.6	4.5	4.4	4.3
2	9.2	9.0	8.8	8.6
3	13.8	13.5	13.2	12.9
4	18.4	18.0	17.6	17.2
5	23.0	22.5	22.0	21.5
6	27.6	27.0	26.4	25.8
7	32.2	31.5	30.8	30.1
8	36.8	36.0	35.2	34.4
9	41.4	40.5	39.6	38.7

P	P			
	42	41	40	39
1	4.2	4.1	4.0	3.9
2	8.4	8.2	8.0	7.8
3	12.6	12.3	12.0	11.7
4	16.8	16.4	16.0	15.6
5	21.0	20.5	20.0	19.5
6	25.2	24.6	24.0	23.4
7	29.4	28.7	28.0	27.3
8	33.6	32.8	32.0	31.2
9	37.8	36.9	36.0	35.1

P	P			
	38	37	36	35
1	3.8	3.7	3.6	3.5
2	7.6	7.4	7.2	7.0
3	11.4	11.1	10.8	10.5
4	15.2	14.8	14.4	14.0
5	19.0	18.5	18.0	17.5
6	22.8	22.2	21.6	21.0
7	26.6	25.9	25.2	24.5
8	30.4	29.6	28.8	28.0
9	34.2	33.3	32.4	31.5

P	P			
	34	33	32	31
1	3.4	3.3	3.2	3.1
2	6.8	6.6	6.4	6.2
3	10.2	9.9	9.6	9.3
4	13.6	13.2	12.8	12.4
5	17.0	16.5	16.0	15.5
6	20.4	19.8	19.2	18.6
7	23.8	23.1	22.4	21.7
8	27.2	26.4	25.6	24.8
9	30.6	29.7	28.8	27.9

P	P			
	30	29	28	27
1	3.0	2.9	2 8	2.7
2	6.0	5.8	5.6	5.4
3	9.0	8.7	8.4	8.1
4	12.0	11.6	11.2	10.8
5	15.0	14.5	14.0	13.5
6	18.0	17.4	16.8	16.2
7	21.0	20.3	19.6	18.9
8	24.0	23.2	22.4	21.6
9	27.0	26.1	25.2	24.3

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SUBTRACTION.

A	B 0	1	2	3	4	5	6	7	8	9
1.00	0.04 576	565	554	543	532	521	510	499	488	477
01	466	455	444	434	423	412	402	391	380	370
02	359	349	338	328	317	307	296	286	275	265
03	255	245	234	224	214	204	194	183	173	163
04	153	143	133	123	113	103	093	084	074	064
05	054	044	035	025	015	006	*996	*986	*977	*967
06	0.03 958	948	938	929	920	910	901	891	882	873
07	863	854	845	835	826	817	808	799	790	781
08	771	762	753	744	735	726	717	708	700	691
09	682	673	664	655	647	638	629	620	612	603
1.10	594	586	577	569	560	552	543	535	526	518
11	509	501	492	484	476	467	459	451	443	434
12	426	418	410	402	393	385	377	369	361	353
13	345	337	329	321	313	305	297	289	282	274
14	266	258	250	243	235	227	219	212	204	196
15	189	181	174	166	159	151	143	136	128	121
16	114	106	099	091	084	077	069	062	055	047
17	040	033	026	018	011	004	*997	*990	*983	*976
18	0.02 969	961	954	947	940	933	926	919	912	906
19	899	892	885	878	871	864	858	851	844	837
1.20	830	824	817	810	804	797	790	784	777	771
21	764	757	751	744	738	731	725	718	712	705
22	699	693	686	680	674	667	661	655	648	642
23	636	629	623	617	611	605	598	592	586	580
24	574	568	562	556	550	544	538	532	526	520
25	514	508	502	496	490	484	478	472	466	461
26	455	449	443	437	432	426	420	414	409	403
27	397	392	386	380	375	369	363	358	352	347
28	341	336	330	325	319	314	308	303	297	292
29	286	281	276	270	265	260	254	249	244	238
1.30	233	228	223	217	212	207	202	196	191	186
31	181	176	171	166	160	155	150	145	140	135
32	130	125	120	115	110	105	100	095	090	085
33	080	075	071	066	061	056	051	046	042	037
34	032	027	022	018	013	008	003	*999	*994	*989
35	0.01 985	980	975	971	966	961	957	952	948	943
36	938	934	929	925	920	916	911	907	902	898
37	893	889	884	880	876	871	867	862	858	854
38	849	845	841	836	832	828	823	819	815	811
39	806	802	798	794	789	785	781	777	773	768
1.40	764	760	756	752	748	744	740	736	731	727
41	723	719	715	711	707	703	699	695	691	687
42	683	679	675	672	668	664	660	656	652	648
43	644	640	637	633	629	625	621	618	614	610
44	606	602	599	595	591	587	584	580	576	573
45	569	565	562	558	554	551	547	543	540	536
46	533	529	525	522	518	515	511	508	504	501
47	497	494	490	487	483	480	476	473	469	466
48	462	459	456	452	449	445	442	439	435	432
49	429	425	422	419	415	412	409	405	402	399
1.50	0.01 396	392	389	386	383	379	376	373	370	366
A	B 0	1	2	3	4	5	6	7	8	9

P	P			
	26	25	24	23
1	2.6	2.5	2.4	2.3
2	5.2	5.0	4.8	4.6
3	7.8	7.5	7.2	6.9
4	10.4	10.0	9.6	9.2
5	13.0	12.5	12.0	11.5
6	15.6	15.0	14.4	13.8
7	18.2	17.5	16.8	16.1
8	20.8	20.0	19.2	18.4
9	23.4	22.5	21.6	20.7

	22	21	20	19
1	2.2	2.1	2.0	1.9
2	4.4	4.2	4.0	3.8
3	6.6	6.3	6.0	5.7
4	8.8	8.4	8.0	7.6
5	11.0	10.5	10.0	9.5
6	13.2	12.6	12.0	11.4
7	15.4	14.7	14.0	13.3
8	17.6	16.8	16.0	15.2
9	19.8	18.9	18.0	17.1

	18	17	16	15
1	1.8	1.7	1.6	1.5
2	3.6	3.4	3.2	3.0
3	5.4	5.1	4.8	4.5
4	7.2	6.8	6.4	6.0
5	9.0	8.5	8.0	7.5
6	10.8	10.2	9.6	9.0
7	12.6	11.9	11.2	10.5
8	14.4	13.6	12.8	12.0
9	16.2	15.3	14.4	13.5

	14	13	12	11
1	1.4	1.3	1.2	1.1
2	2.8	2.6	2.4	2.2
3	4.2	3.9	3.6	3.3
4	5.6	5.2	4.8	4.4
5	7.0	6.5	6.0	5.5
6	8.4	7.8	7.2	6.6
7	9.8	9.1	8.4	7.7
8	11.2	10.4	9.6	8.8
9	12.6	11.7	10.8	9.9

	9	8	7	6	5
1	0.9	0.8	0.7	0.6	0.5
2	1.8	1.6	1.4	1.2	1.0
3	2.7	2.4	2.1	1.8	1.5
4	3.6	3.2	2.8	2.4	2.0
5	4.5	4.0	3.5	3.0	2.5
6	5.4	4.8	4.2	3.6	3.0
7	6.3	5.6	4.9	4.2	3.5
8	7.2	6.4	5.6	4.8	4.0
9	8.1	7.2	6.3	5.4	4.5

P	P

$a > b$. Put $x = \log a - \log b$.

If $x > .3$, then $x = A$ and $\log(a - b) = \log a - B$.

If $x < .3$, then $x = B$ and $\log(a - b) = \log a - A$.

SUBTRACTION.

A	B 0	1	2	3	4	5	6	7	8	9	P P
1 50	0.01 396	392	389	386	383	379	376	373	370	366	
51	363	360	357	354	351	347	344	341	338	335	
52	332	329	326	322	319	316	313	310	307	304	
53	301	298	295	292	289	286	283	280	277	274	
54	271	268	265	262	259	256	253	250	247	244	4
55	242	239	236	233	230	227	224	221	219	216	1 0.4
56	213	210	207	204	202	199	196	193	190	188	2 0.8
57	185	182	179	177	174	171	168	166	163	160	3 1.2
58	158	155	152	150	147	144	142	139	136	134	4 1.6
59	131	128	126	123	120	118	115	113	110	107	5 2.0
1.60	0.01 105	102	100	097	095	092	089	087	084	082	6 2.4
61	079	077	074	072	069	067	064	062	059	057	7 2.8
62	054	052	050	047	045	042	040	037	035	033	8 3.2
63	030	028	025	023	021	018	016	014	011	009	9 3.6
64	006	004	002	*999	*997	*995	*993	*990	*988	*986	
65	0.00 983	981	979	976	974	972	970	967	965	963	
66	961	958	956	954	952	950	947	945	943	941	
67	939	936	934	932	930	928	926	923	921	919	
68	917	915	913	911	908	906	904	902	900	898	
69	896	894	892	890	888	886	883	881	879	877	
1.70	0.00 875	873	871	869	867	865	863	861	859	857	3
71	855	853	851	849	847	845	843	841	839	837	1 0.3
72	836	834	832	830	828	826	824	822	820	818	2 0.6
73	816	814	813	811	809	807	805	803	801	799	3 0.9
74	798	796	794	792	790	788	787	785	783	781	4 1.2
75	779	777	776	774	772	770	768	767	765	763	5 1.5
76	761	760	758	756	754	753	751	749	747	746	6 1.8
77	744	742	740	739	737	735	734	732	730	728	7 2.1
78	727	725	723	722	720	718	717	715	713	712	8 2.4
79	710	708	707	705	704	702	700	699	697	695	9 2.7
1.80	0.00 694	692	691	689	687	686	684	683	681	679	
81	678	676	675	673	672	670	669	667	665	664	
82	662	661	659	658	656	655	653	652	650	649	
83	647	646	644	643	641	640	638	637	635	634	
84	632	631	629	628	626	625	624	622	621	619	
85	618	616	615	614	612	611	609	608	606	605	
86	604	602	601	599	598	597	595	594	593	591	
87	590	588.	587	586	584	583	582	580	579	578	
88	576	575	574	572	571	570	568	567	566	564	
89	563	562	561	559	558	557	555	554	553	551	2
1.90	0.00 550	549	548	546	545	544	543	541	540	539	1 0.2
91	538	536	535	534	533	531	530	529	528	527	2 0.4
92	525	524	523	522	520	519	518	517	516	514	3 0.6
93	513	512	511	510	509	507	506	505	504	503	4 0.8
94	502	500	499	498	497	496	495	493	492	491	5 1.0
95	490	489	488	487	486	484	483	482	481	480	6 1.2
96	479	478	477	476	474	473	472	471	470	469	7 1.4
97	468	467	466	465	464	462	461	460	459	458	8 1.6
98	457	456	455	454	453	452	451	450	449	448	9 1.8
99	447	446	445	444	443	442	441	440	439	437	
2.00	0.00 436	435	434	433	432	431	430	429	428	427	
A	B 0	1	2	3	4	5	6	7	8	9	P P

$a > b$. Put $x = \log a - \log b$.

If $x > .3$, then $x = A$ and $\log(a-b) = \log a - B$.

If $x < .3$, then $x = B$ and $\log(a-b) = \log a - A$.

SUBTRACTION.

A	B 0	1	2	3	4	5	6	7	8	9
2.0	0.00 436	426	417	407	398	389	380	371	363	354
1	346	338	331	323	316	309	302	29$\bar{5}$	288	281
2	27$\bar{5}$	269	262	256	251	24$\bar{5}$	239	234	229	223
3	218	213	208	204	199	194	190	186	181	177
4	173	169	165	162	158	154	151	147	144	141
5	138	134	131	128	125	123	120	117	114	112
6	109	107	104	102	100	097	095	093	091	089
7	087	08$\bar{5}$	083	081	079	077	076	074	072	070
8	069	067	066	064	063	061	060	059	057	056
9	05$\bar{5}$	053	052	051	05$\bar{0}$	049	048	047	046	044
3.0	0.00 043	042	041	041	040	039	038	037	036	035
1	03$\bar{5}$	034	033	032	031	031	030	029	029	028
2	027	027	026	026	02$\bar{5}$	024	024	023	023	022
3	022	021	021	020	020	019	019	019	018	018
4	017	017	017	016	016	015	015	01$\bar{5}$	014	014
5	014	013	013	013	013	012	012	012	011	011
6	011	011	010	010	010	010	010	009	009	009
7	009	008	008	008	008	008	008	007	007	007
8	007	007	007	006	006	006	006	006	006	006
9	005	005	005	005	00$\bar{5}$	00$\bar{5}$	00$\bar{5}$	00$\bar{5}$	00$\bar{5}$	004
4.0	0.00 004	004	004	004	004	004	004	004	004	004
1	003	003	003	003	003	003	003	003	003	003
2	003	003	003	003	002	002	002	002	002	002
3	002	002	002	002	002	002	002	002	002	002
4	002	002	002	002	002	002	002	001	001	001
5	001	001	001	001	001	001	001	001	001	001
6	001	001	001	001	001	001	001	001	001	001
7	001	001	001	001	001	001	001	001	001	001
8	001	001	001	001	001	001	001	001	001	001
9	001	001	001	001	000	000	000	000	000	000
5.0	0.00 000	000	000	000	000	000	000	000	000	000
A	B 0	1	2	3	4	5	6	7	8	9

P	P
	9	8
1	0.9	0.8
2	1.8	1.6
3	2.7	2.4
4	3.6	3.2
5	4.5	4.0
6	5.4	4.8
7	6.3	5.6
8	7.2	6.4
9	8.1	7.2

P	P	
	7	6	5
1	0.7	0.6	0.5
2	1.4	1.2	1.0
3	2.1	1.8	1.5
4	2.8	2.4	2.0
5	3.5	3.0	2.5
6	4.2	3.6	3.0
7	4.9	4.2	3.5
8	5.6	4.8	4.0
9	6.3	5.4	4.5

P	P	
	4	3
1	0.4	0.3
2	0.8	0.6
3	1.2	0.9
4	1.6	1.2
5	2.0	1.5
6	2.4	1.8
7	2.8	2.1
8	3.2	2.4
9	3.6	2.7

$a > b$, $\quad A = \log a - \log b$, $\quad \log(a-b) = \log a - B$.

or $\quad B = \log a - \log b$, $\quad \log(a-b) = \log a - A$.

The above table of Subtraction Logarithms is based on the identity

$$\log(a-b) = \log\left(\frac{a}{\frac{x}{x-1}}\right) = \log a - \log\left(\frac{x}{x-1}\right),$$

where $x = \dfrac{a}{b}$.

The argument is $\log x$, and the function is $\log\left(\dfrac{x}{x-1}\right)$.

A is the argument and B the function when $\log x > .3$, and

B is the argument and A the function when $\log x < .3$.

III

TABLE OF THE LOGARITHMS

OF THE

TRIGONOMETRIC FUNCTIONS

FROM 0° TO 1° AND 89° TO 90° FOR EVERY SECOND,

AND

FROM 1° TO 6° AND 84° TO 89° FOR EVERY TEN SECONDS.

L Cos		*90	L Sin				0°	L Tan				180°	*270°
0.00	′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	
000	0 0	+. —	68557	98660	*16270	*28763	*38454	*46373	*53067	*58866	*63982	*68557	50
000	10	5. 68557	72697	76476	79952	83170	86167	88969	91602	94085	96433	98660	40
000	20	98660	*00779	*02800	*04730	*06579	*08351	*10055	*11694	*13273	*14797	*16270	30
000	30	6. 16270	17694	19072	20409	21705	22964	24188	25378	26536	27664	28763	20
000	40	28763	29836	30882	31904	32903	33879	34833	35767	36682	37577	38454	10
000	50	38454	39315	40158	40985	41797	42594	43376	44145	44900	45643	46373	0 59
000	1 0	6.4 6373	7090	7797	8492	9175	9849	*0512	*1165	*1808	*2442	*3067	50
000	10	6.5 3067	3683	4291	4890	5481	6064	6639	7207	7767	8320	8866	40
000	20	8866	9406	9939	*0465	*0985	*1499	*2007	*2509	*3006	*3496	*3982	30
000	30	6.6 3982	4462	4936	5406	5870	6330	6785	7235	7680	8121	8557	20
000	40	8557	8990	9418	9841	*0261	*0676	*1088	*1496	*1900	*2300	*2697	10
000	50	6.7 2697	3090	3479	3865	4248	4627	5003	5376	5746	6112	6476	0 58
000	2 0	6476	6836	7193	7548	7900	8248	8595	8938	9278	9616	9952	50
000	10	9952	*0285	*0615	*0943	*1268	*1591	*1911	*2230	*2545	*2859	*3170	40
000	20	6.8 3170	3479	3786	4091	4394	4694	4993	5289	5584	5876	6167	30
000	30	6167	6455	6742	7027	7310	7591	7870	8147	8423	8697	8969	20
000	40	8969	9240	9509	9776	*0042	*0306	*0568	*0829	*1088	*1346	*1602	10
000	50	6.9 1602	1857	2110	2362	2612	2861	3109	3355	3599	3843	4085	0 57
000	3 0	4085	4325	4565	4803	5039	5275	5509	5742	5973	6204	6433	50
000	10	6433	6661	6888	7113	7338	7561	7783	8004	8224	8443	8660	40
000	20	8660	8877	9093	9307	9520	9733	9944	*0155	*0364	*0572	*0779	30
000	30	7.0 0779	0986	1191	1395	1599	1801	2003	2203	2403	2602	2800	20
000	40	2800	2997	3193	3388	3582	3776	3968	4160	4351	4541	4730	10
000	50	4730	4919	5106	5293	5479	5664	5849	6032	6215	6397	6579	0 56
000	4 0	6579	6759	6939	7118	7296	7474	7651	7827	8003	8177	8351	50
000	10	8351	8525	8698	8870	9041	9211	9381	9551	9719	9887	*0055	40
000	20	7.1 0055	0222	0388	0553	0718	0882	1046	1209	1371	1533	1694	30
000	30	1694	1854	2014	2174	2333	2491	2648	2805	2962	3118	3273	20
000	40	3273	3428	3582	3736	3889	4042	4194	4346	4497	4647	4797	10
000	50	4797	4947	5096	5244	5392	5540	5687	5833	5979	6125	6270	0 55
0.00		10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″ ′
L Sin		L Cos					89°	L Cot			*179°	269°	*359°

L Cos L Sin **0°** *90° 180° *270°

	144	143	142	141	140	139		138	137	136	135	134	133	
1	14.4	14.3	14.2	14.1	14.0	13.9	1	13.8	13.7	13.6	13.5	13.4	13.3	1
2	28.8	28.6	28.4	28.2	28.0	27.8	2	27.6	27.4	27.2	27.0	26.8	26.6	2
3	43.2	42.9	42.6	42.3	42.0	41.7	3	41.4	41.1	40.8	40.5	40.2	39.9	3
4	57.6	57.2	56.8	56.4	56.0	55.6	4	55.2	54.8	54.4	54.0	53.6	53.2	4
5	72.0	71.5	71.0	70.5	70.0	69.5	5	69.0	68.5	68.0	67.5	67.0	66.5	5
6	86.4	85.8	85.2	84.6	84.0	83.4	6	82.8	82.2	81.6	81.0	80.4	79.8	6
7	100.8	100.1	99.4	98.7	98.0	97.3	7	96.6	95.9	95.2	94.5	93.8	93.1	7
8	115.2	114.4	113.6	112.8	112.0	111.2	8	110.4	109.6	108.8	108.0	107.2	106.4	8
9	129.6	128.7	127.8	126.9	126.0	125.1	9	124.2	123.3	122.4	121.5	120.6	119.7	9

	132	131	130	129	128	127		126	125	124	123	122	121	
1	13.2	13.1	13.0	12.9	12.8	12.7	1	12.6	12.5	12.4	12.3	12.2	12.1	1
2	26.4	26.2	26.0	25.8	25.6	25.4	2	25.2	25.0	24.8	24.6	24.4	24.2	2
3	39.6	39.3	39.0	38.7	38.4	38.1	3	37.8	37.5	37.2	36.9	36.6	36.3	3
4	52.8	52.4	52.0	51.6	51.2	50.8	4	50.4	50.0	49.6	49.2	48.8	48.4	4
5	66.0	65.5	65.0	64.5	64.0	63.5	5	63.0	62.5	62.0	61.5	61.0	60.5	5
6	79.2	78.6	78.0	77.4	76.8	76.2	6	75.6	75.0	74.4	73.8	73.2	72.6	6
7	92.4	91.7	91.0	90.3	89.6	88.9	7	88.2	87.5	86.8	86.1	85.4	84.7	7
8	105.6	104.8	104.0	103.2	102.4	101.6	8	100.8	100.0	99.2	98.4	97.6	96.8	8
9	118.8	117.9	117.0	116.1	115.2	114.3	9	113.4	112.5	111.6	110.7	109.8	108.9	9

	120	119	118	117	116	115		114	113	112	111	110	109	
1	12.0	11.9	11.8	11.7	11.6	11.5	1	11.4	11.3	11.2	11.1	11.0	10.9	1
2	24.0	23.8	23.6	23.4	23.2	23.0	2	22.8	22.6	22.4	22.2	22.0	21.8	2
3	36.0	35.7	35.4	35.1	34.8	34.5	3	34.2	33.9	33.6	33.3	33.0	32.7	3
4	48.0	47.6	47.2	46.8	46.4	46.0	4	45.6	45.2	44.8	44.4	44.0	43.6	4
5	60.0	59.5	59.0	58.5	58.0	57.5	5	57.0	56.5	56.0	55.5	55.0	54.5	5
6	72.0	71.4	70.8	70.2	69.6	69.0	6	68.4	67.8	67.2	66.6	66.0	65.4	6
7	84.0	83.3	82.6	81.9	81.2	80.5	7	79.8	79.1	78.4	77.7	77.0	76.3	7
8	96.0	95.2	94.4	93.6	92.8	92.0	8	91.2	90.4	89.6	88.8	88.0	87.2	8
9	108.0	107.1	106.2	105.3	104.4	103.5	9	102.6	101.7	100.8	99.9	99.0	98.1	9

0.00	′	″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	
000	5	0	7.1 6270	6414	6558	6702	6845	6987	7130	7271	7413	7553	7694	50
000		10	7694	7834	7973	8112	8250	8389	8526	8663	8800	8937	9072	40
000		20	9072	9208	9343	9478	9612	9746	9879	*0012	*0145	*0277	*0409	30
000		30	7.2 0409	0540	0671	0802	0932	1062	1191	1320	1449	1577	1705	20
000		40	1705	1833	1960	2087	2213	2339	2465	2590	2715	2840	2964	10
000		50	2964	3088	3212	3335	3458	3580	3702	3824	3946	4067	4188	0 54
000	6	0	4188	4308	4428	4548	4668	4787	4906	5024	5142	5260	5378	50
000		10	5378	5495	5612	5728	5845	5961	6076	6192	6307	6421	6536	40
000		20	6536	6650	6764	6877	6991	7104	7216	7329	7441	7552	7664	30
000		30	7664	7775	7886	7997	8107	8217	8327	8437	8546	8655	8763	20
000		40	8763	8872	8980	9088	9196	9303	9410	9517	9623	9730	9836	10
000		50	9836	9942	*0047	*0152	*0257	*0362	*0467	*0571	*0675	*0779	*0882	0 53
000	7	0	7.3 0882	0986	1089	1191	1294	1396	1498	1600	1702	1803	1904	50
000		10	1904	2005	2106	2206	2306	2406	2506	2606	2705	2804	2903	40
000		20	2903	3001	3100	3198	3296	3393	3491	3588	3685	3782	3879	30
000		30	3879	3975	4071	4167	4263	4359	4454	4549	4644	4739	4833	20
000		40	4833	4928	5022	5116	5209	5303	5396	5489	5582	5675	5767	10
000		50	5767	5860	5952	6044	6135	6227	6318	6409	6500	6591	6682	0 52
000	8	0	6682	6772	6862	6952	7042	7132	7221	7310	7399	7488	7577	50
000		10	7577	7666	7754	7842	7930	8018	8106	8193	8280	8367	8454	40
000		20	8454	8541	8628	8714	8800	8887	8972	9058	9144	9229	9314	30
000		30	9314	9400	9484	9569	9654	9738	9822	9906	9990	*0074	*0158	20
000		40	7.4 0158	0241	0324	0408	0491	0573	0656	0739	0821	0903	0985	10
000		50	0985	1067	1149	1230	1312	1393	1474	1555	1636	1716	1797	0 51
000	9	0	1797	1877	1957	2037	2117	2197	2277	2356	2435	2515	2594	50
000		10	2594	2673	2751	2830	2908	2987	3065	3143	3221	3299	3376	40
000		20	3376	3454	3531	3608	3685	3762	3839	3916	3992	4069	4145	30
000		30	4145	4221	4297	4373	4449	4524	4600	4675	4750	4825	4900	20
000		40	4900	4975	5050	5124	5199	5273	5347	5421	5495	5569	5643	10
000		50	5643	5716	5790	5863	5936	6009	6082	6155	6228	6300	6373	0 50
0.00			10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″ ′

L Sin *179° 269° *359° **89°** L Cos

L Tan 0° *90° 180° *270°

	108	107	106	105	104	103		102	101	99	98	97	96	
1	10.8	10.7	10.6	10.5	10.4	10.3	1	10.2	10.1	9.9	9.8	9.7	9.6	1
2	21.6	21.4	21.2	21.0	20.8	20.6	2	20.4	20.2	19.8	19.6	19.4	19.2	2
3	32.4	32.1	31.8	31.5	31.2	30.9	3	30.6	30.3	29.7	29.4	29.1	28.8	3
4	43.2	42.8	42.4	42.0	41.6	41.2	4	40.8	40.4	39.6	39.2	38.8	38.4	4
5	54.0	53.5	53.0	52.5	52.0	51.5	5	51.0	50.5	49.5	49.0	48.5	48.0	5
6	64.8	64.2	63.6	63.0	62.4	61.8	6	61.2	60.6	59.4	58.8	58.2	57.6	6
7	75.6	74.9	74.2	73.5	72.8	72.1	7	71.4	70.7	69.3	68.6	67.9	67.2	7
8	86.4	85.6	84.8	84.0	83.2	82.4	8	81.6	80.8	79.2	78.4	77.6	76.8	8
9	97.2	96.3	95.4	94.5	93.6	92.7	9	91.8	90.9	89.1	88.2	87.3	86.4	9

	95	94	93	92	91	90		89	88	87	86	85	84	
1	9.5	9.4	9.3	9.2	9.1	9.0	1	8.9	8.8	8.7	8.6	8.5	8.4	1
2	19.0	18.8	18.6	18.4	18.2	18.0	2	17.8	17.6	17.4	17.2	17.0	16.8	2
3	28.5	28.2	27.9	27.6	27.3	27.0	3	26.7	26.4	26.1	25.8	25.5	25.2	3
4	38.0	37.6	37.2	36.8	36.4	36.0	4	35.6	35.2	34.8	34.4	34.0	33.6	4
5	47.5	47.0	46.5	46.0	45.5	45.0	5	44.5	44.0	43.5	43.0	42.5	42.0	5
6	57.0	56.4	55.8	55.2	54.6	54.0	6	53.4	52.8	52.2	51.6	51.0	50.4	6
7	66.5	65.8	65.1	64.4	63.7	63.0	7	62.3	61.6	60.9	60.2	59.5	58.8	7
8	76.0	75.2	74.4	73.6	72.8	72.0	8	71.2	70.4	69.6	68.8	68.0	67.2	8
9	85.5	84.6	83.7	82.8	81.9	81.0	9	80.1	79.2	78.3	77.4	76.5	75.6	9

	83	82	81	80	79	78		77	76	75	74	73	72	
1	8.3	8.2	8.1	8.0	7.9	7.8	1	7.7	7.6	7.5	7.4	7.3	7.2	1
2	16.6	16.4	16.2	16.0	15.8	15.6	2	15.4	15.2	15.0	14.8	14.6	14.4	2
3	24.9	24.6	24.3	24.0	23.7	23.4	3	23.1	22.8	22.5	22.2	21.9	21.6	3
4	33.2	32.8	32.4	32.0	31.6	31.2	4	30.8	30.4	30.0	29.6	29.2	28.8	4
5	41.5	41.0	40.5	40.0	39.5	39.0	5	38.5	38.0	37.5	37.0	36.5	36.0	5
6	49.8	49.2	48.6	48.0	47.4	46.8	6	46.2	45.6	45.0	44.4	43.8	43.2	6
7	58.1	57.4	56.7	56.0	55.3	54.6	7	53.9	53.2	52.5	51.8	51.1	50.4	7
8	66.4	65.6	64.8	64.0	63.2	62.4	8	61.6	60.8	60.0	59.2	58.4	57.6	8
9	74.7	73.8	72.9	72.0	71.1	70.2	9	69.3	68.4	67.5	66.6	65.7	64.8	9

′	″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	
5	0	7.1 6270	6414	6558	6702	6845	6988	7130	7271	7413	7553	7694	50
	10	7694	7834	7973	8112	8250	8389	8526	8663	8800	8937	9073	40
	20	9073	9208	9343	9478	9612	9746	9879	*0012	*0145	*0277	*0409	30
	30	7.2 0409	0540	0671	0802	0932	1062	1191	1321	1449	1577	1705	20
	40	1705	1833	1960	2087	2213	2339	2465	2590	2715	2840	2964	10
	50	2964	3088	3212	3335	3458	3580	3703	3824	3946	4067	4188	0 54
6	0	4188	4308	4428	4548	4668	4787	4906	5024	5142	5260	5378	50
	10	5378	5495	5612	5728	5845	5961	6076	6192	6307	6421	6536	40
	20	6536	6650	6764	6877	6991	7104	7216	7329	7441	7552	7664	30
	30	7664	7775	7886	7997	8107	8217	8327	8437	8546	8655	8764	20
	40	8764	8872	8980	9088	9196	9303	9410	9517	9624	9730	9836	10
	50	9836	9942	*0047	*0153	*0258	*0362	*0467	*0571	*0675	*0779	*0882	0 53
7	0	7.3 0882	0986	1089	1192	1294	1396	1499	1600	1702	1803	1904	50
	10	1904	2005	2106	2206	2307	2406	2506	2606	2705	2804	2903	40
	20	2903	3001	3100	3198	3296	3394	3491	3588	3685	3782	3879	30
	30	3879	3975	4071	4167	4263	4359	4454	4549	4644	4739	4833	20
	40	4833	4928	5022	5116	5209	5303	5396	5489	5582	5675	5767	10
	50	5767	5860	5952	6044	6135	6227	6318	6409	6500	6591	6682	0 52
8	0	6682	6772	6862	6952	7042	7132	7221	7310	7400	7488	7577	50
	10	7577	7666	7754	7842	7930	8018	8106	8193	8281	8368	8455	40
	20	8455	8541	8628	8714	8801	8887	8973	9058	9144	9229	9315	30
	30	9315	9400	9485	9569	9654	9738	9823	9907	9991	*0074	*0158	20
	40	7.4 0158	0241	0325	0408	0491	0574	0656	0739	0821	0903	0985	10
	50	0985	1067	1149	1230	1312	1393	1474	1555	1636	1716	1797	0 51
9	0	1797	1877	1958	2038	2117	2197	2277	2356	2436	2515	2594	50
	10	2594	2673	2751	2830	2909	2987	3065	3143	3221	3299	3376	40
	20	3376	3454	3531	3608	3686	3762	3839	3916	3992	4069	4145	30
	30	4145	4221	4297	4373	4449	4524	4600	4675	4750	4825	4900	20
	40	4900	4975	5050	5124	5199	5273	5347	5421	5495	5569	5643	10
	50	5643	5716	5790	5863	5936	6009	6082	6155	6228	6300	6373	0 50
		10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″ ′

*179° 269° *359° 89° L Cot

L Cos L Sin 0° *90° 180° *270°

0.00	′	″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″			P P
000	10	0	7.46 373	44$\bar{5}$	517	589	661	733	80$\bar{5}$	876	948	*019	*090	50		72
000		10	7.47 090	162	233	303	374	44$\bar{5}$	515	586	656	726	797	40	1	7.2
000		20	797	867	936	*006	*076	*14$\bar{5}$	*21$\bar{5}$	*284	*353	*422	*491	30	2	14.4
000		30	7.48 491	560	629	698	766	83$\bar{5}$	903	971	*039	*108	*175	20	3	21.6
000		40	7.49 175	243	311	379	446	513	581	648	71$\bar{5}$	782	849	10	4	28.8
000		50	849	916	982	*049	*115	*182	*248	*314	*380	*446	*512	0 49	5	36.0
															6	43.2
000	11	0	7.50 512	578	643	709	774	840	90$\bar{5}$	970	*035	*100	*16$\bar{5}$	50	7	50.4
000		10	7.51 16$\bar{5}$	230	294	359	423	488	552	616	680	·744	808	40	8	57.6
000		20	808	872	936	999	*063	*126	*190	*253	*316	*379	*442	30	9	64.8
000		30	7.52 442	505	568	631	693	756	818	881	943	*005	*067	20		70
000		40	7.53 067	129	191	253	31$\bar{5}$	376	438	499	561	622	683	10	1	7.0
000		50	683	744	805	866	927	988	*049	*109	*170	*230	*291	0 48	2	14.0
															3	21.0
000	12	0	7.54 291	351	411	471	531	591	651	711	771	830	890	50	4	28.0
000		10	890	949	*009	*068	*127	*186	*245	*304	*363	*422	*481	40	5	35.0
000		20	7.55 481	539	598	656	71$\bar{5}$	773	831	889	948	*006	*064	30	6	42.0
000		30	7.56 064	121	179	237	29$\bar{5}$	352	410	467	524	582	639	20	7	49.0
000		40	639	696	753	810	867	924	980	*037	*094	*150	*206	10	8	56.0
000		50	7.57 206	263	319	375	431	488	544	599	655	711	767	0 47	9	63.0
																68
000	13	0	767	822	878	934	989	*044	*100	*15$\bar{5}$	*210	*265	*320	50	1	6.8
000		10	7.58 320	375	430	48$\bar{5}$	539	594	649	703	758	812	866	40	2	13.6
000		20	866	921	97$\bar{5}$	*029	*083	*137	*191	*24$\bar{5}$	*299	*352	*406	30	3	20.4
000		30	7.59 406	459	513	566	620	673	726	780	833	886	939	20	4	27.2
000		40	939	992	*04$\bar{5}$	*097	*150	*203	*255	*308	*360	*413	*465	10	5	34.0
000		50	7.60 465	517	570	622	674	726	778	830	882	934	985	0 46	6	40.8
															7	47.6
000	14	0	985	*037	*089	*140	*192	*243	*294	*346	*397	*448	*499	50	8	54.4
000		10	7.61 499	550	601	652	703	754	80$\bar{5}$	855	906	957	*007	40	9	61.2
000		20	7.62 007	058	108	158	209	259	309	359	409	459	509	30		66
000		30	509	559	609	659	708	758	808	857	907	956	*006	20	1	6.6
000		40	7.63 006	05$\bar{5}$	104	153	203	252	301	35̄0	399	448	496	10	2	13.2
000		50	496	545	594	642	691	740	788	837	88$\bar{5}$	933	982	0 45	3	19.8
															4	26.4
000	15	0	982	*030	*078	*126	*174	*222	*270	*318	*366	*414	*461	50	5	33.0
000		10	7.64 461	509	557	604	652	699	747	794	842	889	936	40	6	39.6
000		20	936	983	*030	*078	*12$\bar{5}$	*172	*218	*265	*312	*359	*406	30	7	46.2
000		30	7.65 406	452	499	546	592	638	68$\bar{5}$	731	778	824	870	20	8	52.8
000		40	870	916	962	*009	*05$\bar{5}$	*101	*146	*192	*238	*284	*330	10	9	59.4
000		50	7.66 330	375	421	467	512	558	603	649	694	739	784	0 44		64
															1	6.4
000	16	0	784	830	87$\bar{5}$	920	965	*010	*055	*100	*14$\bar{5}$	*190	*23$\bar{5}$	50	2	12.8
000		10	7.67 23$\bar{5}$	279	324	369	413	458	502	547	591	636	680	40	3	19.2
*000		20	680	724	768	813	857	901	945	989	*033	*077	*121	30	4	25.6
*999		30	7.68 121	16$\bar{5}$	208	252	296	340	383	427	470	514	557	20	5	32.0
999		40	557	601	644	687	731	774	817	860	903	946	989	10	6	38.4
999		50	989	*032	*075	*118	*161	*204	*247	*289	*332	*37$\bar{5}$	*417	0 43	7	44.8
															8	51.2
999	17	0	7.69 417	460	502	54$\bar{5}$	587	630	672	714	757	799	841	50	9	57.6
999		10	841	883	925	967	*009	*051	*093	*135	*177	*219	*261	40		62
999		20	7.70 261	302	344	386	427	469	510	552	593	63$\bar{5}$	676	30	1	6.2
999		30	676	718	759	800	841	883	924	96$\bar{5}$	*006	*047	*088	20	2	12.4
999		40	7.71 088	129	170	211	251	292	333	374	414	455	496	10	3	18.6
999		50	496	536	577	617	658	698	739	779	819	859	900	0 42	4	24.8
															5	31.0
999	18	0	900	940	980	*020	*060	*100	*140	*180	*220	*260	*300	50	6	37.2
999		10	7.72 300	340	380	419	459	499	53$\bar{8}$	578	618	657	697	40	7	43.4
999		20	697	736	775	81$\bar{5}$	854	894	933	972	*011	*050	*090	30	8	49.6
999		30	7.73 090	129	168	207	246	28$\bar{5}$	324	363	401	440	479	20	9	55.8
999		40	479	51$\bar{8}$	557	595	634	673	711	75̄0	788	827	865	10		61
999		50	865	904	942	980	*019	*057	*095	*133	*171	*210	*248	0 41	1	6.1
															2	12.2
999	19	0	7.74 248	286	324	362	400	438	476	514	551	589	627	50	3	18.3
999		10	627	66$\bar{5}$	703	740	778	815	853	89̄1	928	966	*003	40	4	24.4
999		20	7.75 003	040	078	115	153	190	227	264	302	339	376	30	5	30.5
999		30	376	413	450	487	524	561	598	63$\bar{5}$	672	709	745	20	6	36.6
999		40	745	782	819	856	892	929	966	*002	*039	*075	*112	10	7	42.7
999		50	7.76 112	148	185	221	258	294	330	367	403	439	475	0 40	8	48.8
															9	54.9
																60
															1	6.0
															2	12.0
															3	18.0
															4	24.0
															5	30.0
															6	36.0
															7	42.0
															8	48.0
															9	54.0
9.99			10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″	′	P P

L Sin *179° 269° *359 89° L Cos

L Tan 0° *90° 180° *270°

′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		P P
10 0	7.46 373	445	517	589	661	733	805	876	948	*019	*091	50	59 | 58 | 57
10	7.47 091	162	233	304	374	445	516	586	656	727	797	40	1, 5.9 | 5.8 | 5.7
20	797	867	937	*006	*076	*146	*215	*284	*354	*423	*492	30	2 11.8 | 11.6 | 11.4
30	7.48 492	561	629	698	767	835	903	972	*040	*108	*176	20	3 17.7 | 17.4 | 17.1
40	7.49 176	243	311	379	446	514	581	648	715	782	849	10	4 23.6 | 23.2 | 22.8
50	849	916	982	*049	*115	*182	*248	*314	*380	*446	*512	0 49	5 29.5 | 29.0 | 28.5
													6 35.4 | 34.8 | 34.2
													7 41.3 | 40.6 | 39.9
													8 47.2 | 46.4 | 45.6
													9 53.1 | 52.2 | 51.3
11 0	7.50 512	578	643	709	774	840	905	970	*035	*100	*165	50	56 | 55 | 54
10	7.51 165	230	295	359	424	488	552	617	681	745	809	40	1 5.6 | 5.5 | 5.4
20	809	872	936	*000	*063	*127	*190	*253	*316	*380	*443	30	2 11.2 | 11.0 | 10.8
30	7.52 443	505	568	631	694	756	819	881	943	*005	*067	20	3 16.8 | 16.5 | 16.2
40	7.53 067	129	191	253	315	377	438	500	561	622	683	10	4 22.4 | 22.0 | 21.6
50	683	745	806	867	927	988	*049	*110	*170	*231	*291	0 48	5 28.0 | 27.5 | 27.0
													6 33.6 | 33.0 | 32.4
													7 39.2 | 38.5 | 37.8
													8 44.8 | 44.0 | 43.2
													9 50.4 | 49.5 | 48.6
12 0	7.54 291	351	411	471	532	591	651	711	771	830	890	50	53 | 52 | 51
10	890	949	*009	*068	*127	*186	*245	*304	*363	*422	*481	40	1 5.3 | 5.2 | 5.1
20	7.55 481	539	598	657	715	773	832	890	948	*006	*064	30	2 10.6 | 10.4 | 10.2
30	7.56 064	122	179	237	295	352	410	467	525	582	639	20	3 15.9 | 15.6 | 15.3
40	639	696	753	810	867	924	981	*037	*094	*150	*207	10	4 21.2 | 20.8 | 20.4
50	7.57 207	263	319	376	432	488	544	600	656	711	767	0 47	5 26.5 | 26.0 | 25.5
													6 31.8 | 31.2 | 30.6
													7 37.1 | 36.4 | 35.7
													8 42.4 | 41.6 | 40.8
													9 47.7 | 46.8 | 45.9
13 0	767	823	878	934	989	045	*100	*155	*210	*265	*320	50	50 | 49 | 48
10	7.58 320	375	430	485	540	594	649	704	758	812	867	40	1 5.0 | 4.9 | 4.8
20	867	921	975	*029	*083	*137	*191	*245	*299	*353	*406	30	2 10.0 | 9.8 | 9.6
30	7.59 406	460	513	567	620	673	727	780	833	886	939	20	3 15.0 | 14.7 | 14.4
40	939	992	*045	*098	*150	*203	*256	*308	*361	*413	*466	10	4 20.0 | 19.6 | 19.2
50	7.60 466	518	570	622	674	726	778	830	882	934	986	0 46	5 25.0 | 24.5 | 24.0
													6 30.0 | 29.4 | 28.8
													7 35.0 | 34.3 | 33.6
													8 40.0 | 39.2 | 38.4
													9 45.0 | 44.1 | 43.2
14 0	986	*037	*089	*140	*192	*243	*295	*346	*397	*449	*500	50	47 | 46 | 45
10	7.61 500	551	602	653	704	754	805	856	906	957	*008	40	1 4.7 | 4.6 | 4.5
20	7.62 008	058	108	159	209	259	310	360	410	460	510	30	2 9.4 | 9.2 | 9.0
30	510	560	609	659	709	759	808	858	907	957	*006	20	3 14.1 | 13.8 | 13.5
40	7.63 006	055	105	154	203	252	301	350	399	448	497	10	4 18.8 | 18.4 | 18.0
50	497	546	594	643	692	740	789	837	885	934	982	0 45	5 23.5 | 23.0 | 22.5
													6 28.2 | 27.6 | 27.0
													7 32.9 | 32.2 | 31.5
													8 37.6 | 36.8 | 36.0
													9 42.3 | 41.4 | 40.5
15 0	982	*030	*078	*127	*175	*223	*271	*318	*366	*414	*462	50	44 | 43 | 42
10	7.64 462	510	557	605	652	700	747	795	842	889	937	40	1 4.4 | 4.3 | 4.2
20	937	984	*031	*078	*125	*172	*219	*266	*313	*359	*406	30	2 8.8 | 8.6 | 8.4
30	7.65 406	453	499	546	592	639	685	732	778	824	871	20	3 13.2 | 12.9 | 12.6
40	871	917	963	*009	*055	*101	*147	*193	*239	*284	*330	10	4 17.6 | 17.2 | 16.8
50	7.66 330	376	421	467	513	558	604	649	694	740	785	0 44	5 22.0 | 21.5 | 21.0
													6 26.4 | 25.8 | 25.2
													7 30.8 | 30.1 | 29.4
													8 35.2 | 34.4 | 33.6
													9 39.6 | 38.7 | 37.8
16 0	785	830	875	920	966	*011	*056	*100	*145	*190	*235	50	41 | 40 | 39
10	7.67 235	280	324	369	414	458	503	547	592	636	680	40	1 4.1 | 4.0 | 3.9
20	680	725	769	813	857	901	946	990	*034	*077	*121	30	2 8.2 | 8.0 | 7.8
30	7.68 121	165	209	253	296	340	384	427	471	514	558	20	3 12.3 | 12.0 | 11.7
40	558	601	645	688	731	774	818	861	904	947	990	10	4 16.4 | 16.0 | 15.6
50	990	*033	*076	*119	*162	*204	*247	*290	*333	*375	*418	0 43	5 20.5 | 20.0 | 19.5
													6 24.6 | 24.0 | 23.4
													7 28.7 | 28.0 | 27.3
													8 32.8 | 32.0 | 31.2
													9 36.9 | 36.0 | 35.1
17 0	7.69 418	460	503	545	588	630	673	715	757	799	842	50	38 | 37 | 36
10	842	884	926	968	*010	*052	*094	*136	*178	*219	*261	40	1 3.8 | 3.7 | 3.6
20	7.70 261	303	345	386	428	469	511	553	594	635	677	30	2 7.6 | 7.4 | 7.2
30	677	718	759	801	842	883	924	965	*006	*047	*088	20	3 11.4 | 11.1 | 10.8
40	7.71 088	129	170	211	252	293	334	374	415	456	496	10	4 15.2 | 14.8 | 14.4
50	496	537	577	618	658	699	739	779	820	860	900	0 42	5 19.0 | 18.5 | 18.0
													6 22.8 | 22.2 | 21.6
													7 26.6 | 25.9 | 25.2
													8 30.4 | 29.6 | 28.8
													9 34.2 | 33.3 | 32.4
18 0	900	940	981	*021	*061	*101	*141	*181	*221	*261	*301	50	
10	7.72 301	340	380	420	460	499	539	579	618	658	697	40	
20	697	737	776	815	855	894	933	973	*012	*051	*090	30	
30	7.73 090	129	168	207	246	285	324	363	402	441	480	20	
40	480	518	557	596	635	673	712	750	789	827	866	10	
50	866	904	943	981	*019	*058	*096	*134	*172	*210	*248	0 41	
19 0	7.74 248	286	325	363	401	438	476	514	552	590	628	50	
10	628	665	703	741	779	816	854	891	929	966	*004	40	
20	7.75 004	041	079	116	153	191	228	265	302	339	377	30	
30	377	414	451	488	525	562	599	636	672	709	746	20	
40	746	783	820	856	893	930	966	*003	*040	*076	*113	10	
50	7.76 113	149	186	222	258	295	331	367	404	440	476	0 40	
	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″ ′	P P

*179° 269° *359 89° L Cot

L Cos L Sin 0° *90° 180° *270°

9·99	′	″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		
999	20	0	7·76 475	512	548	584	620	656	692	728	764	800	836	50	
999		10	836	872	907	943	979	*015	*051	*086	*122	*158	*193	40	
999		20	7·77 193	229	264	300	335	371	406	442	477	512	548	30	
999		30	548	583	618	654	689	724	759	794	829	864	899	20	
999		40	899	934	969	*004	*039	*074	*109	*144	*179	*213	*248	10	
999		50	7·78 248	283	318	352	387	422	456	491	525	560	594	0	39
999	21	0	594	629	663	698	732	766	801	835	869	903	938	50	
999		10	938	972	*006	*040	*074	*108	*142	*176	*210	*244	*278	40	
999		20	7·79 278	312	346	380	414	448	481	515	549	582	616	30	
999		30	616	650	683	717	751	784	818	851	885	918	952	20	
999		40	952	985	*018	*052	*085	*118	*152	*185	*218	*251	*284	10	
999		50	7·80 284	317	351	384	417	450	483	516	549	582	615	0	38
999	22	0	615	647	680	713	746	779	812	844	877	910	942	50	
999		10	942	975	*008	*040	*073	*105	*138	*170	*203	*235	*268	40	
999		20	7·81 268	300	332	365	397	429	462	494	526	558	591	30	
999		30	591	623	655	687	719	751	783	815	847	879	911	20	
999		40	911	943	975	*007	*039	*070	*102	*134	*166	*198	*229	10	
999		50	7·82 229	261	293	324	356	387	419	451	482	514	545	0	37
999	23	0	545	577	608	639	671	702	733	765	796	827	859	50	
999		10	859	890	921	952	983	*015	*046	*077	*108	*139	*170	40	
999		20	7·83 170	201	232	263	294	325	356	387	417	448	479	30	
999		30	479	510	541	571	602	633	663	694	725	755	786	20	
999		40	786	817	847	878	908	939	969	*000	*030	*060	*091	10	
999		50	7·84 091	121	151	182	212	242	273	303	333	363	393	0	36
999	24	0	393	424	454	484	514	544	574	604	634	664	694	50	
999		10	694	724	754	784	814	843	873	903	933	963	992	40	
999		20	992	*022	*052	*082	*111	*141	*171	*200	*230	*259	*289	30	
999		30	7·85 289	318	348	377	407	436	466	495	525	554	583	20	
999		40	583	613	642	671	701	730	759	788	817	847	876	10	
999		50	876	905	934	963	992	*021	*050	*079	*108	*137	*166	0	35
999	25	0	7·86 166	195	224	253	282	311	340	368	397	426	455	50	
999		10	455	484	512	541	570	598	627	656	684	713	741	40	
999		20	741	770	799	827	856	884	913	941	969	998	*026	30	
999		30	7·87 026	055	083	111	140	168	196	224	253	281	309	20	
999		40	309	337	366	394	422	450	478	506	534	562	590	10	
999		50	590	618	646	674	702	730	758	786	814	842	870	0	34
999	26	0	870	897	925	953	981	*009	*036	*064	*092	*119	*147	50	
999		10	7·88 147	175	202	230	258	285	313	340	368	395	423	40	
999		20	423	450	478	505	533	560	587	615	642	669	697	30	
999		30	697	724	751	779	806	833	860	888	915	942	969	20	
999		40	969	996	*023	*050	*077	*105	*132	*159	*186	*213	*240	10	
999		50	7·89 240	267	294	320	347	374	401	428	455	482	509	0	33
999	27	0	509	535	562	589	616	642	669	696	722	749	776	50	
999		10	776	802	829	856	882	909	935	962	988	*015	*041	40	
999		20	7·90 041	068	094	121	147	174	200	226	253	279	305	30	
999		30	305	332	358	384	411	437	463	489	515	542	568	20	
999		40	568	594	620	646	672	698	725	751	777	803	829	10	
999		50	829	855	881	907	933	958	984	*010	*036	*062	*088	0	32
999	28	0	7·91 088	114	140	165	191	217	243	269	294	320	346	50	
999		10	346	371	397	423	448	474	500	525	551	576	602	40	
999		20	602	627	653	678	704	729	755	780	806	831	857	30	
999		30	857	882	907	933	958	983	*009	*034	*059	*085	*110	20	
998		40	7·92 110	135	160	186	211	236	261	286	311	336	362	10	
998		50	362	387	412	437	462	487	512	537	562	587	612	0	31
998	29	0	612	637	662	687	712	737	761	786	811	836	861	50	
998		10	861	886	910	935	960	985	*009	*034	*059	*084	*108	40	
998		20	7·93 108	133	158	182	207	231	256	281	305	330	354	30	
998		30	354	379	403	428	452	477	501	526	550	575	599	20	
998		40	599	623	648	672	696	721	745	769	794	818	842	10	
998		50	842	866	891	915	939	963	988	*012	*036	*060	*084	0	30
9·99			10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″	′

L Sin *179° 269° *359° 89° L Cos

L Tan 0° .*90° 180° *270°

′	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″			P	P
20	7.76 476	512	548	585	621	657	693	729	765	801	837	50		37	36
10	837	872	908	944	980	*016	*051	*087	*123	*158	*194	40	1	3.7	3.6
20	7.77 194	230	265	301	336	372	407	442	478	513	549	30	2	7.4	7.2
30	549	584	619	654	690	725	760	795	830	865	900	20	3	11.1	10.8
40	900	935	970	*005	*040	*075	*110	*145	*179	*214	*249	10	4	14.8	14.4
50	7.78 249	284	318	353	388	422	457	492	526	561	595	0	39	5	18.5	18.0
														6	22.2	21.6
21	595	630	664	698	733	767	801	836	870	904	938	50		7	25.9	25.2
10	938	973	*007	*041	*075	*109	*143	*177	*211	*245	*279	40		8	29.6	28.8
20	7.79 279	313	347	381	415	448	482	516	550	583	617	30		9	33.3	32.4
30	617	651	684	718	751	785	819	852	886	919	952	20			35	34
40	952	986	*019	*053	*086	*119	*152	*186	*219	*252	*285	10		1	3.5	3.4
50	7.80 285	318	351	385	418	451	484	517	550	583	615	0	38	2	7.0	6.8
														3	10.5	10.2
22	615	648	681	714	747	780	812	845	878	911	943	50		4	14.0	13.6
10	943	976	*009	*041	*074	*106	*139	*171	*204	*236	*269	40		5	17.5	17.0
20	7.81 269	301	333	366	398	430	463	495	527	559	591	30		6	21.0	20.4
30	591	624	656	688	720	752	784	816	848	880	912	20		7	24.5	23.8
40	912	944	976	*008	*040	*071	*103	*135	*167	*198	*230	10		8	28.0	27.2
50	7.82 230	262	294	325	357	388	420	452	483	515	546	0	37	9	31.5	30.6
															33	32
23	546	578	609	640	672	703	734	766	797	828	860	50		1	3.3	3.2
10	860	891	922	953	984	*016	*047	*078	*109	*140	*171	40		2	6.6	6.4
20	7.83 171	202	233	264	295	326	357	388	418	449	480	30		3	9.9	9.6
30	480	511	542	572	603	634	664	695	726	756	787	20		4	13.2	12.8
40	787	818	848	879	909	940	970	*001	*031	*061	*092	10		5	16.5	16.0
50	7.84 092	122	152	183	213	243	274	304	334	364	394	0	36	6	19.8	19.2
														7	23.1	22.4
24	394	425	455	485	515	545	575	605	635	665	695	50		8	26.4	25.6
10	695	725	755	785	815	845	874	904	934	964	993	40		9	29.7	28.8
20	993	*023	*053	*083	*112	*142	*172	*201	*231	*260	*290	30			31	30
30	7.85 290	319	349	378	408	437	467	496	526	555	584	20		1	3.1	3.0
40	584	614	643	672	702	731	760	789	819	848	877	10		2	6.2	6.0
50	877	906	935	964	993	*022	*051	*080	*109	*138	*167	0	35	3	9.3	9.0
														4	12.4	12.0
25	7.86 167	196	225	254	283	312	341	370	398	427	456	50		5	15.5	15.0
10	456	485	513	542	571	600	628	657	685	714	743	40		6	18.6	18.0
20	743	771	800	828	857	885	914	942	971	999	*027	30		7	21.7	21.0
30	7.87 027	056	084	113	141	169	197	226	254	282	310	20		8	24.8	24.0
40	310	339	367	395	423	451	479	507	535	563	591	10		9	27.9	27.0
50	591	619	647	675	703	731	759	787	815	843	871	0	34		29	28
														1	2.9	2.8
26	871	899	926	954	982	*010	*037	*065	*093	*121	*148	50		2	5.8	5.6
10	7.88 148	176	204	231	259	286	314	342	369	397	424	40		3	8.7	8.4
20	424	452	479	506	534	561	589	616	643	671	698	30		4	11.6	11.2
30	698	725	753	780	807	834	862	889	916	943	970	20		5	14.5	14.0
40	970	997	*025	*052	*079	*106	*133	*160	*187	*214	*241	10		6	17.4	16.8
50	7.89 241	268	295	322	349	376	403	429	456	483	510	0	33	7	20.3	19.6
														8	23.2	22.4
27	510	537	563	590	617	644	670	697	724	750	777	50		9	26.1	25.2
10	777	804	830	857	884	910	937	963	990	*016	*043	40			27	26
20	7.90 043	069	096	122	149	175	201	228	254	280	307	30		1	2.7	2.6
30	307	333	359	386	412	438	464	491	517	543	569	20		2	5.4	5.2
40	569	595	622	648	674	700	726	752	778	804	830	10		3	8.1	7.8
50	830	856	882	908	934	960	986	*012	*038	*064	*089	0	32	4	10.8	10.4
														5	13.5	13.0
28	7.91 089	115	141	167	193	218	244	270	296	321	347	50		6	16.2	15.6
10	347	373	398	424	450	475	501	527	552	578	603	40		7	18.9	18.2
20	603	629	654	680	705	731	756	782	807	833	858	30		8	21.6	20.8
30	858	883	909	934	960	985	*010	*036	*061	*086	*111	20		9	24.3	23.4
40	7.92 111	137	162	187	212	237	263	288	313	338	363	10			25	24
50	363	388	413	438	463	488	513	538	563	588	613	0	31	1	2.5	2.4
														2	5.0	4.8
29	613	638	663	688	713	738	763	788	813	838	862	50		3	7.5	7.2
10	862	887	912	937	961	986	*011	*036	*060	*085	*110	40		4	10.0	9.6
20	7.93 110	134	159	184	208	233	258	282	307	331	356	30		5	12.5	12.0
30	356	380	405	429	454	478	503	527	552	576	601	20		6	15.0	14.4
40	601	625	649	674	698	722	747	771	795	820	844	10		7	17.5	16.8
50	844	868	892	917	941	965	989	*013	*038	*062	*086	0	30	8	20.0	19.2
														9	22.5	21.6
	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″	′	P	P

*179° 269° *359° 89° L Cot

L Cos L Sin 0° *90° 180° *270°

9.99	′	″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		
998	30	0	7.94 084	108	132	157	181	205	229	253	277	301	325	50	
998		10	325	349	373	397	421	445	469	492	516	540	564	40	
998		20	564	588	612	636	659	683	707	731	755	778	802	30	
998		30	802	826	849	873	897	921	944	968	991	*015	*039	20	
998		40	7.95 039	062	086	109	133	157	180	204	227	251	274	10	
998		50	274	298	321	344	368	391	415	438	461	485	508	0	29
998	31	0	508	532	555	578	601	625	648	671	695	718	741	50	
998		10	741	764	787	811	834	857	880	903	926	950	973	40	
998		20	973	996	*019	*042	*065	*088	*111	*134	*157	*180	*203	30	
998		30	7.96 203	226	249	272	295	318	341	364	386	409	432	20	
998		40	432	455	478	501	524	546	569	592	615	637	660	10	
998		50	660	683	706	728	751	774	796	819	842	864	887	0	28
998	32	0	887	910	932	955	977	*000	*022	*045	*068	*090	*113	50	
998		10	7.97 113	135	158	180	202	225	247	270	292	315	337	40	
998		20	337	359	382	404	426	449	471	493	516	538	560	30	
998		30	560	583	605	627	649	672	694	716	738	760	782	20	
998		40	782	805	827	849	871	893	915	937	959	981	*003	10	
998		50	7.98 003	025	048	070	092	114	136	157	179	201	223	0	27
998	33	0	223	245	267	289	311	333	355	377	398	420	442	50	
998		10	442	464	486	508	529	551	573	595	616	638	660	40	
998		20	660	682	703	725	747	768	790	812	833	855	876	30	
998		30	876	898	920	941	963	984	*006	*027	*049	*070	*092	20	
998		40	7.99 092	113	135	156	178	199	221	242	264	285	306	10	
998		50	306	328	349	371	392	413	435	456	477	499	520	0	26
998	34	0	520	541	562	584	605	626	647	669	690	711	732	50	
998		10	732	753	775	796	817	838	859	880	901	922	943	40	
998		20	943	965	986	*007	*028	*049	*070	*091	*112	*133	*154	30	
998		30	8.00 154	175	196	217	238	259	279	300	321	342	363	20	
998		40	363	384	405	426	447	467	488	509	530	551	571	10	
998		50	571	592	613	634	654	675	696	717	737	758	779	0	25
998	35	0	779	799	820	841	861	882	903	923	944	964	985	50	
998		10	985	*006	*026	*047	*067	*088	*108	*129	*149	*170	*190	40	
998		20	8.01 190	211	231	252	272	293	313	333	354	374	395	30	
998		30	395	415	435	456	476	496	517	537	557	578	598	20	
998		40	598	618	639	659	679	699	720	740	760	780	801	10	
998		50	801	821	841	861	881	901	922	942	962	982	*002	0	24
998	36	0	8.02 002	022	042	062	082	102	123	143	163	183	203	50	
998		10	203	223	243	263	283	303	323	343	362	382	402	40	
998		20	402	422	442	462	482	502	522	542	561	581	601	30	
998		30	601	621	641	661	680	700	720	740	759	779	799	20	
998		40	799	819	838	858	878	898	917	937	957	976	996	10	
998		50	996	*016	*035	*055	*074	*094	*114	*133	*153	*172	*192	0	23
997	37	0	8.03 192	212	231	251	270	290	309	329	348	368	387	50	
997		10	387	407	426	446	465	484	504	523	543	562	581	40	
997		20	581	601	620	640	659	678	698	717	736	756	775	30	
997		30	775	794	813	833	852	871	891	910	929	948	967	20	
997		40	967	987	*006	*025	*044	*063	*083	*102	*121	*140	*159	10	
997		50	8.04 159	178	197	217	236	255	274	293	312	331	350	0	22
997	38	0	350	369	388	407	426	445	464	483	502	521	540	50	
997		10	540	559	578	597	616	635	654	673	692	710	729	40	
997		20	729	748	767	786	805	824	843	861	880	899	918	30	
997		30	918	937	955	974	993	*012	*030	*049	*068	*087	*105	20	
997		40	8.05 105	124	143	161	180	199	218	236	255	274	292	10	
997		50	292	311	329	348	367	385	404	422	441	460	478	0	21
997	39	0	478	497	515	534	552	571	589	608	626	645	663	50	
997		10	663	682	700	719	737	756	774	792	811	829	848	40	
997		20	848	866	885	903	921	940	958	976	995	*013	*031	30	
997		30	8.06 031	050	068	086	105	123	141	159	178	196	214	20	
997		40	214	232	251	269	287	305	324	342	360	378	396	10	
997		50	396	414	433	451	469	487	505	523	541	560	578	0	20
9.99			10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	′	

L Sin *179° 269° *359° 89° L Cos

L Tan 0° *90° 180° *270°

′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		P P
30 0	7.94 086	110	134	158	182	206	230	254	278	302	326	50	25
10	326	350	374	398	422	446	470	494	518	542	566	40	1 2.5
20	566	590	613	637	661	685	709	732	756	780	804	30	2 5.0
30	804	827	851	875	899	922	946	970	993	*017	*040	20	3 7.5
40	7.95 040	064	088	111	135	158	182	205	229	252	276	10	4 10.0
50	276	299	323	346	370	393	416	440	463	487	510	0 29	5 12.5
31 0	510	533	557	580	603	627	650	673	696	720	743	50	6 15.0
10	743	766	789	812	836	859	882	905	928	951	974	40	7 17.5
20	974	998	*021	*044	*067	*090	*113	*136	*159	*182	*205	30	8 20.0
30	7.96 205	228	251	274	297	320	343	365	388	411	434	20	9 22.5
40	434	457	480	503	525	548	571	594	617	639	662	10	24 23
50	662	685	708	730	753	776	798	821	844	866	889	0 28	1 2.4 2.3
32 0	889	911	934	957	979	*002	*024	*047	*069	*092	*114	50	2 4.8 4.6
10	7.97 114	137	159	182	204	227	249	272	294	317	339	40	3 7.2 6.9
20	339	361	384	406	428	451	473	495	518	540	562	30	4 9.6 9.2
30	562	585	607	629	651	673	696	718	740	762	784	20	5 12.0 11.5
40	784	807	829	851	873	895	917	939	961	983	*005	10	6 14.4 13.8
50	7.98 005	027	050	072	094	116	138	159	181	203	225	0 27	7 16.8 16.1
33 0	225	247	269	291	313	335	357	379	400	422	444	50	8 19.2 18.4
10	444	466	488	510	531	553	575	597	618	640	662	40	9 21.6 20.7
20	662	684	705	727	749	770	792	814	835	857	878	30	22
30	878	900	922	943	965	986	*008	*029	*051	*073	*094	20	1 2.2
40	7.99 094	116	137	158	180	201	223	244	266	287	308	10	2 4.4
50	308	330	351	373	394	415	437	458	479	501	522	0 26	3 6.6
34 0	522	543	564	586	607	628	649	671	692	713	734	50	4 8.8
10	734	755	777	798	819	840	861	882	903	925	946	40	5 11.0
20	946	967	988	*009	*030	*051	*072	*093	*114	*135	*156	30	6 13.2
30	8.00 156	177	198	219	240	261	282	303	324	344	365	20	7 15.4
40	365	386	407	428	449	470	490	511	532	553	574	10	8 17.6
50	574	594	615	636	657	677	698	719	740	760	781	0 25	9 19.8
35 0	781	802	822	843	964	884	905	925	946	967	987	50	21
10	987	*008	*028	*049	*070	*090	*111	*131	*152	*172	*193	40	1 2.1
20	8.01 193	213	234	254	274	295	315	336	356	377	397	30	2 4.2
30	397	417	438	458	478	499	519	539	560	580	600	20	3 6.3
40	600	621	641	661	682	702	722	742	762	783	803	10	4 8.4
50	803	823	843	863	884	904	924	944	964	984	*004	0 24	5 10.5
36 0	8.02 004	025	045	065	085	105	125	145	165	185	205	50	6 12.6
10	205	225	245	265	285	305	325	345	365	385	405	40	7 14.7
20	405	425	445	464	484	504	524	544	564	584	604	30	8 16.8
30	604	623	643	663	683	703	722	742	762	782	801	20	9 18.9
40	801	821	841	861	880	900	920	939	959	979	998	10	20 19
50	998	*018	*038	*057	*077	*097	*116	*136	*155	*175	*194	0 23	1 2.0 1.9
37 0	8.03 194	214	234	253	273	292	312	331	351	370	390	50	2 4.0 3.8
10	390	409	429	448	468	487	506	526	545	565	584	40	3 6.0 5.7
20	584	603	623	642	661	681	700	720	739	758	777	30	4 8.0 7.6
30	777	797	816	835	855	874	893	912	932	951	970	20	5 10.0 9.5
40	970	989	*008	*028	*047	*066	*085	*104	*124	*143	*162	10	6 12.0 11.4
50	8.04 162	181	200	219	238	257	276	296	315	334	353	0 22	7 14.0 13.3
38 0	353	372	391	410	429	448	467	486	505	524	543	50	8 16.0 15.2
10	543	562	581	600	619	638	656	675	694	713	732	40	9 18.0 17.1
20	732	751	770	789	808	826	845	864	883	902	921	30	18
30	921	939	958	977	996	*014	*033	*052	*071	*089	*108	20	1 1.8
40	8.05 108	127	146	164	183	202	220	239	258	276	295	10	2 3.6
50	295	314	332	351	369	388	407	425	444	462	481	0 21	3 5.4
39 0	481	499	518	537	555	574	592	611	629	648	666	50	4 7.2
10	666	685	703	722	740	758	777	795	814	832	851	40	5 9.0
20	851	869	887	906	924	943	961	979	998	*016	*034	30	6 10.8
30	8.06 034	053	071	089	107	126	144	162	181	199	217	20	7 12.6
40	217	235	254	272	290	308	326	345	363	381	399	10	8 14.4
50	399	417	436	454	472	490	508	526	544	562	581	0 20	9 16.2
	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″ ′	P P

*179° 269° *359° 89° L Cot

L Cos L Sin 0° *90° 180° *270°

9·99	′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	
997	40 0	8.06 578	596	614	632	650	668	686	704	722	740	758	50
997	10	758	776	794	812	830	848	866	884	902	920	938	40
997	20	938	956	974	992	*010	*028	*046	*063	*081	*099	*117	30
997	30	8.07 117	135	153	171	189	206	224	242	260	278	295	20
997	40	295	313	331	349	367	384	402	420	438	455	473	10
997	50	473	491	509	526	544	562	579	597	615	632	650	0 19
997	41 0	650	668	685	703	721	738	756	773	791	809	826	50
997	10	826	844	861	879	896	914	932	949	967	984	*002	40
997	20	8.08 002	019	037	054	072	089	107	124	141	159	176	30
997	30	176	194	211	229	246	263	281	298	316	333	350	20
997	40	350	368	385	403	420	437	455	472	489	506	524	10
997	50	524	541	558	576	593	610	627	645	662	679	696	0 18
997	42 0	696	714	731	748	765	783	800	817	834	851	868	50
997	10	868	886	903	920	937	954	971	988	*006	*023	*040	40
997	20	8.09 040	057	074	091	108	125	142	159	176	193	210	30
997	30	210	227	244	261	278	295	312	329	346	363	380	20
997	40	380	397	414	431	448	465	482	499	516	533	550	10
997	50	550	567	583	600	617	634	651	668	685	701	718	0 17
997	43 0	718	735	752	769	786	802	819	836	853	870	886	50
997	10	886	903	920	937	953	970	987	*004	*020	*037	*054	40
997	20	8.10 054	070	087	104	120	137	154	170	187	204	220	30
997	30	220	237	254	270	287	303	320	337	353	370	386	20
996	40	386	403	420	436	453	469	486	502	519	535	552	10
996	50	552	568	585	601	618	634	651	667	684	700	717	0 16
996	44 0	717	733	750	766	782	799	815	832	848	864	881	50
996	10	881	897	914	930	946	963	979	995	*012	*028	*044	40
996	20	8.11 044	061	077	093	110	126	142	159	175	191	207	30
996	30	207	224	240	256	272	289	305	321	337	354	370	20
996	40	370	386	402	418	435	451	467	483	499	515	531	10
996	50	531	548	564	580	596	612	628	644	660	677	693	0 15
996	45 0	693	709	725	741	757	773	789	805	821	837	853	50
996	10	853	869	885	901	917	933	949	965	981	997	*013	40
996	20	8.12 013	029	045	061	077	093	109	125	141	157	172	30
996	30	172	188	204	220	236	252	268	284	300	315	331	20
996	40	331	347	363	379	395	410	426	442	458	474	489	10
996	50	489	505	521	537	553	568	584	600	616	631	647	0 14
996	46 0	647	663	679	694	710	726	741	757	773	788	804	50
996	10	804	820	836	851	867	882	898	914	929	945	961	40
996	20	961	976	992	*007	*023	*039	*054	*070	*085	*101	*117	30
996	30	8.13 117	132	148	163	179	194	210	225	241	256	272	20
996	40	272	287	303	318	334	349	365	380	396	411	427	10
996	50	427	442	458	473	489	504	519	535	550	566	581	0 13
996	47 0	581	596	612	627	643	658	673	689	704	719	735	50
996	10	735	750	765	781	796	811	827	842	857	873	888	40
996	20	888	903	919	934	949	964	980	995	*010	*025	*041	30
996	30	8.14 041	056	071	086	101	117	132	147	162	178	193	20
996	40	193	208	223	238	253	269	284	299	314	329	344	10
996	50	344	359	375	390	405	420	435	450	465	480	495	0 12
996	48 0	495	510	525	541	556	571	586	601	616	631	646	50
996	10	646	661	676	691	706	721	736	751	766	781	796	40
996	20	796	811	826	841	856	871	886	901	915	930	945	30
996	30	945	960	975	990	*005	*020	*035	*050	*065	*079	*094	20
996	40	8.15 094	109	124	139	154	169	183	198	213	228	243	10
996	50	243	258	272	287	302	317	332	346	361	376	391	0 11
996	49 0	391	406	420	435	450	465	479	494	509	523	538	50
996	10	538	553	568	582	597	612	626	641	656	670	685	40
996	20	685	700	714	729	744	758	773	788	802	817	832	30
995	30	832	846	861	875	890	905	919	934	948	963	978	20
995	40	978	992	*007	*021	*036	*050	*065	*079	*094	*109	*123	10
995	50	8.16 123	138	152	167	181	196	210	225	239	254	268	0 10
9·99		10″	9″	8″	7″	6″	5″	4″	3″	2	1	0	″ ′

L Sin *179° 269° *359° 89° L Cos

L Tan 0° *90° 180° *270°

′ ″	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		P	P
40 0	8.06 581	599	617	635	653	671	689	707	725	743	761	50		
10	761	779	797	815	833	851	869	887	905	923	941	40		
20	941	959	977	995	*013	*031	*049	*066	*084	*102	*120	30		
30	8.07 120	138	156	174	192	209	227	245	263	281	298	20		18
40	298	316	334	352	370	387	405	423	441	458	476	10	1	1.8
50	476	494	512	529	547	565	582	600	618	635	653	0 19	2	3.6
41 0	653	671	688	706	724	741	759	776	794	812	829	50	3	5.4
10	829	847	864	882	900	917	935	952	970	987	*005	40	4	7.2
20	8.08 005	022	040	057	075	092	110	127	145	162	180	30	5	9.0
30	180	197	214	232	249	267	284	301	319	336	354	20	6	10.8
40	354	371	388	406	423	440	458	475	492	510	527	10	7	12.6
50	527	544	562	579	596	613	631	648	665	682	700	0 18	8	14.4
42 0	700	717	734	751	769	786	803	820	837	855	872	50	9	16.2
10	872	889	906	923	940	957	975	992	*009	*026	*043	40		
20	8.09 043	060	077	094	111	128	146	163	180	197	214	30		17
30	214	231	248	265	282	299	316	333	350	367	384	20		
40	384	401	418	435	452	468	485	502	519	536	553	10	1	1.7
50	553	570	587	604	621	637	654	671	688	705	722	0 17	2	3.4
43 0	722	739	755	772	789	806	823	839	856	873	890	50	3	5.1
10	890	907	923	940	957	974	990	*007	*024	*040	*057	40	4	6.8
20	8.10 057	074	091	107	124	141	157	174	191	207	224	30	5	8.5
30	224	240	257	274	290	307	324	340	357	373	390	20	6	10.2
40	390	407	423	440	456	473	489	506	522	539	555	10	7	11.9
50	555	572	588	605	621	638	654	671	687	704	720	0 16	8	13.6
44 0	720	737	753	770	786	802	819	835	852	868	884	50	9	15.3
10	884	901	917	934	950	966	983	999	*015	*032	*048	40		
20	8.11 048	064	081	097	113	130	146	162	178	195	211	30		16
30	211	227	244	260	276	292	309	325	341	357	373	20	1	1.6
40	373	390	406	422	438	454	471	487	503	519	535	10	2	3.2
50	535	551	567	584	600	616	632	648	664	680	696	0 15	3	4.8
45 0	696	712	729	745	761	777	793	809	825	841	857	50	4	6.4
10	857	873	889	905	921	937	953	969	985	*001	*017	40	5	8.0
20	8.12 017	033	049	065	081	097	113	129	144	160	176	30	6	9.6
30	176	192	208	224	240	256	272	288	303	319	335	20	7	11.2
40	335	351	367	383	398	414	430	446	462	478	493	10	8	12.8
50	493	509	525	541	556	572	588	604	620	635	651	0 14	9	14.4
46 0	651	667	682	698	714	730	745	761	777	792	808	50		
10	808	824	839	855	871	886	902	918	933	949	965	40		
20	965	980	996	*011	*027	*043	*058	*074	*089	*105	*121	30		15
30	8.13 121	136	152	167	183	198	214	229	245	260	276	20	1	1.5
40	276	291	307	322	338	353	369	384	400	415	431	10	2	3.0
50	431	446	462	477	493	508	523	539	554	570	585	0 13	3	4.5
47 0	585	601	616	631	647	662	677	693	708	724	739	50	4	6.0
10	739	754	770	785	800	816	831	846	861	877	892	40	5	7.5
20	892	907	923	938	953	968	984	999	*014	*029	*045	30	6	9.0
30	8.14 045	060	075	090	106	121	136	151	166	182	197	20	7	10.5
40	197	212	227	242	258	273	288	303	318	333	348	10	8	12.0
50	348	364	379	394	409	424	439	454	469	484	500	0 12	9	13.5
48 0	500	515	530	545	560	575	590	605	620	635	650	50		
10	650	665	680	695	710	725	740	755	770	785	800	40		
20	800	815	830	845	860	875	890	905	920	935	950	30		14
30	950	965	980	994	*009	*024	*039	*054	*069	*084	*099	20	1	1.4
40	8.15 099	114	128	143	158	173	188	203	218	232	247	10	2	2.8
50	247	262	277	292	306	321	336	351	366	380	395	0 11	3	4.2
49 0	395	410	425	439	454	469	484	498	513	528	543	50	4	5.6
10	543	557	572	587	602	616	631	646	660	675	690	40	5	7.0
20	690	704	719	734	748	763	778	792	807	822	836	30	6	8.4
30	836	851	865	880	895	909	924	938	953	968	982	20	7	9.8
40	982	997	*011	*026	*040	*055	*070	*084	*099	*113	*128	10	8	11.2
50	8.16 128	142	157	171	186	200	215	229	244	258	273	0 10	9	12.6
	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″	P	P

*179° 269° *359 89° L Cot

L Cos L Sin 0° *90° 180° *270°

9.99	′	′	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		
995	50	0	8.16 268	283	297	311	326	340	355	369	384	398	413	50	
995		10	413	427	441	456	470	485	499	513	528	542	557	40	
995		20	557	571	585	600	614	628	643	657	672	686	700	30	
995		30	700	715	729	743	757	772	786	800	815	829	843	20	
995		40	843	858	872	886	900	915	929	943	957	972	986	10	
995		50	986	*000	*014	*029	*043	*057	*071	*085	*100	*114	*128	0	9
995	51	0	8.17 128	142	156	171	185	199	213	227	241	256	270	50	
995		10	270	284	298	312	326	340	355	369	383	397	411	40	
995		20	411	425	439	453	467	481	495	510	524	538	552	30	
995		30	552	566	580	594	608	622	636	650	664	678	692	20	
995		40	692	706	720	734	748	762	776	790	804	818	832	10	
995		50	832	846	860	874	888	902	916	930	943	957	971	0	8
995	52	0	971	985	999	*013	*027	*041	*055	*069	*082	*096	*110	50	
995		10	8.18 110	124	138	152	166	180	193	207	221	235	249	40	
995		20	249	263	276	290	304	318	332	345	359	373	387	30	
995		30	387	401	414	428	442	456	469	483	497	511	524	20	
995		40	524	538	552	566	579	593	607	621	634	648	662	10	
995		50	662	675	689	703	716	730	744	757	771	785	798	0	7
995	53	0	798	812	826	839	853	867	880	894	908	921	935	50	
995		10	935	948	962	976	989	*003	*016	*030	*044	*057	*071	40	
995		20	8.19 071	084	098	111	125	139	152	166	179	193	206	30	
995		30	206	220	233	247	260	274	287	301	314	328	341	20	
995		40	341	355	368	382	395	409	422	436	449	463	476	10	
995		50	476	489	503	516	530	543	557	570	583	597	610	0	6
995	54	0	610	624	637	650	664	677	691	704	717	731	744	50	
995		10	744	757	771	784	797	811	824	837	851	864	877	40	
995		20	877	891	904	917	931	944	957	971	984	997	*010	30	
995		30	8.20 010	024	037	050	064	077	090	103	117	130	143	20	
995		40	143	156	170	183	196	209	222	236	249	262	275	10	
994		50	275	288	302	315	328	341	354	368	381	394	407	0	5
994	55	0	407	420	433	446	460	473	486	499	512	525	538	50	
994		10	538	552	565	578	591	604	617	630	643	656	669	40	
994		20	669	682	696	709	722	735	748	761	774	787	800	30	
994		30	800	813	826	839	852	865	878	891	904	917	930	20	
994		40	930	943	956	969	982	995	*008	*021	*034	*047	*060	10	
994		50	8.21 060	073	086	099	112	125	138	151	164	177	189	0	4
994	56	0	189	202	215	228	241	254	267	280	293	306	319	50	
994		10	319	331	344	357	370	383	396	409	422	434	447	40	
994		20	447	460	473	486	499	511	524	537	550	563	576	30	
994		30	576	588	601	614	627	640	652	665	678	691	703	20	
994		40	703	716	729	742	754	767	780	793	805	818	831	10	
994		50	831	844	856	869	882	895	907	920	933	945	958	0	3
994	57	0	958	971	983	996	*009	*022	*034	*047	*060	*072	*085	50	
994		10	8.22 085	098	110	123	136	148	161	173	186	199	211	40	
994		20	211	224	237	249	262	274	287	300	312	325	337	30	
994		30	337	350	363	375	388	400	413	425	438	451	463	20	
994		40	463	476	488	501	513	526	538	551	563	576	588	10	
994		50	588	601	613	626	638	651	663	676	688	701	713	0	2
994	58	0	713	726	738	751	763	776	788	801	813	826	838	50	
994		10	838	850	863	875	888	900	913	925	937	950	962	40	
994		20	962	975	987	999	*012	*024	*037	*049	*061	*074	*086	30	
994		30	8.23 086	098	111	123	136	148	160	173	185	197	210	20	
994		40	210	222	234	247	259	271	284	296	308	321	333	10	
994		50	333	345	357	370	382	394	407	419	431	443	456	0	1
994	59	0	456	468	480	492	505	517	529	541	554	566	578	50	
994		10	578	590	603	615	627	639	652	664	676	688	700	40	
994		20	700	713	725	737	749	761	773	786	798	810	822	30	
993		30	822	834	846	859	871	883	895	907	919	931	944	20	
993		40	944	956	968	980	992	*004	*016	*028	*041	*053	*065	10	
993		50	8.24 065	077	089	101	113	125	137	149	161	173	186	0	0

9.99	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″

L Sin *179° 269° *359° 89° L Cos

L Tan — 0° — *90° 180° *270°

′	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″		P	P
50	8.16 273	287	302	316	331	345	359	374	388	403	417	50		
10	417	432	446	460	475	489	504	518	533	547	561	40		
20	561	576	590	604	619	633	647	662	676	691	705	30		
30	705	719	734	748	762	776	791	805	819	834	848	20		
40	848	862	877	891	905	919	934	948	962	976	991	10		15
50	991	*005	*019	*033	*048	*062	*076	*090	*104	*119	*133	0 9	1	1.5
51 0	8.17 133	147	161	175	190	204	218	232	246	260	275	50	2	3.0
10	275	289	303	317	331	345	359	373	388	402	416	40	3	4.5
20	416	430	444	458	472	486	500	514	528	543	557	30	4	6.0
30	557	571	585	599	613	627	641	655	669	683	697	20	5	7.5
40	697	711	725	739	753	767	781	795	809	823	837	10	6	9.0
50	837	851	865	879	893	907	921	934	948	962	976	0 8	7	10.5
52 0	976	990	*004	*018	*032	*046	*060	*074	*087	*101	*115	50	8	12.0
10	8.18 115	129	143	157	171	185	198	212	226	240	254	40	9	13.5
20	254	268	281	295	309	323	337	351	364	378	392	30		
30	392	406	419	433	447	461	475	488	502	516	530	20		
40	530	543	557	571	585	598	612	626	639	653	667	10		
50	667	681	694	708	722	735	749	763	776	790	804	0 7		
53 0	804	817	831	845	858	872	886	899	913	926	940	50		
10	940	954	967	981	994	*008	*022	*035	*049	*062	*076	40		14
20	8.19 076	090	103	117	130	144	157	171	184	198	211	30	1	1.4
30	211	225	239	252	266	279	293	306	320	333	347	20	2	2.8
40	347	360	374	387	401	414	427	441	454	468	481	10	3	4.2
50	481	495	508	522	535	548	562	575	589	602	616	0 6	4	5.6
54 0	615	629	642	656	669	683	696	709	723	736	749	50	5	7.0
10	749	763	776	789	803	816	830	843	856	870	883	40	6	8.4
20	883	896	910	923	936	949	963	976	989	*003	*016	30	7	9.8
30	8.20 016	029	042	056	069	082	096	109	122	135	149	20	8	11.2
40	149	162	175	188	201	215	228	241	254	268	281	10	9	12.6
50	281	294	307	320	334	347	360	373	386	399	413	0 5		
55 0	413	426	439	452	465	478	491	505	518	531	544	50		
10	544	557	570	583	596	610	623	636	649	662	675	40		
20	675	688	701	714	727	740	753	767	780	793	806	30		13
30	806	819	832	845	858	871	884	897	910	923	936	20	1	1.3
40	936	949	962	975	988	*001	*014	*027	*040	*053	*066	10	2	2.6
50	8.21 066	079	092	105	118	131	144	156	169	182	195	0 4	3	3.9
56 0	195	208	221	234	247	260	273	286	299	311	324	50	4	5.2
10	324	337	350	363	376	389	402	414	427	440	453	40	5	6.5
20	453	466	479	492	504	517	530	543	556	569	581	30	6	7.8
30	581	594	607	620	633	645	658	671	684	697	709	20	7	9.1
40	709	722	735	748	760	773	786	799	811	824	837	10	8	10.4
50	837	850	862	875	888	901	913	926	939	951	964	0 3	9	11.7
57 0	964	977	989	*002	*015	*028	*040	*053	*066	*078	*091	50		
10	8.22 091	104	116	129	142	154	167	179	192	205	217	40		
20	217	230	243	255	268	280	293	306	318	331	343	30		
30	343	356	369	381	394	406	419	431	444	457	469	20		12
40	469	482	494	507	519	532	544	557	569	582	595	10	1	1.2
50	595	607	620	632	645	657	670	682	695	707	720	0 2	2	2.4
58 0	720	732	744	757	769	782	794	807	819	832	844	50	3	3.6
10	844	857	869	881	894	906	919	931	944	956	968	40	4	4.8
20	968	981	993	*006	*018	030	*043	*055	*068	*080	*092	30	5	6.0
30	8.23 092	105	117	130	142	154	167	179	191	204	216	20	6	7.2
40	216	228	241	253	265	278	290	302	315	327	339	10	7	8.4
50	339	352	364	376	388	401	413	425	438	450	462	0 1	8	9.6
59 0	462	474	487	499	511	523	536	548	560	572	585	50	9	10.8
10	585	597	609	621	634	646	658	670	682	695	707	40		
20	707	719	731	743	756	768	780	792	804	816	829	30		
30	829	841	853	865	877	889	902	914	926	938	950	20		
40	950	962	974	987	999	*011	*023	*035	*047	*059	*071	10		
50	8.24 071	083	096	108	120	132	144	156	168	180	192	0 0		
	10″	9″	8″	7″	6″	5″	4″	3″	2″	1″	0″	″ ′	P	P

*179° 269° *359° — 89° — L Cot

L Cos — L Sin — 1° — *91° 181° *271°

9.99	′	0″	10″	20″	30″	40″	50″	60″		P	P
993	0	8.24 186	306	426	546	665	785	903	59		120	119	118
993	1	903	*022	*140	*258	*375	*493	*609	58	1	12.0	11.9	11.8
993	2	8.25 609	726	842	958	*074	*189	*304	57	2	24.0	23.8	23.6
993	3	8.26 304	419	533	648	761	875	988	56	3	36.0	35.7	35.4
992	4	938	*101	*214	*326	*438	*550	*661	55	4	48.0	47.6	47.2
										5	60.0	59.5	59.0
992	5	8.27 661	773	883	994	*104	*215	*324	54	6	72.0	71.4	70.8
992	6	8.28 324	434	543	652	761	869	977	53	7	84.0	83.3	82.6
992	7	977	*085	*193	*300	*407	*514	*621	52	8	96.0	95.2	94.4
992	8	8.29 621	727	833	939	*044	*150	*255	51	9	108.0	107.1	106.2
991	9	8.30 255	359	464	568	672	776	879	50		117	116	115
991	10	879	983	*086	*188	*291	*393	*495	49	1	11.7	11.6	11.5
991	11	8.31 495	597	699	800	901	*002	*103	48	2	23.4	23.2	23.0
990	12	8.32 103	203	303	403	503	602	702	47	3	35.1	34.8	34.5
990	13	702	801	899	998	*096	*195	*292	46	4	46.8	46.4	46.0
990	14	8.33 292	390	488	585	682	779	875	45	5	58.5	58.0	57.5
										6	70.2	69.6	69.0
990	15	875	972	*068	*164	*260	*355	*450	44	7	81.9	81.2	80.5
989	16	8.34 450	546	640	735	830	924	*018	43	8	93.6	92.8	92.0
989	17	8.35 018	112	206	299	392	485	578	42	9	105.3	104.4	103.5
989	18	578	671	764	856	948	*040	*131	41		114	113	112	111
989	19	8.36 131	223	314	405	496	587	678	40	1	11.4	11.3	11.2	11.1
										2	22.8	22.6	22.4	22.2
988	20	678	768	858	948	*038	*128	*217	39	3	34.2	33.9	33.6	33.3
988	21	8.37 217	306	395	484	573	662	750	38	4	45.6	45.2	44.8	44.4
988	22	750	838	926	*014	*101	*189	*276	37	5	57.0	56.5	56.0	55.5
987	23	8.38 276	363	450	537	624	710	796	36	6	68.4	67.8	67.2	66.6
987	24	796	882	968	*054	*139	*225	*310	35	7	79.8	79.1	78.4	77.7
										8	91.2	90.4	89.6	88.8
987	25	8.39 310	395	480	565	649	734	818	34	9	102.6	101.7	100.8	99.9
986	26	818	902	986	*070	*153	*237	*320	33		110	109	108	107
986	27	8.40 320	403	486	569	651	734	816	32	1	11.0	10.9	10.8	10.7
986	28	816	898	980	*062	*144	*225	*307	31	2	22.0	21.8	21.6	21.4
985	29	8.41 307	388	469	550	631	711	792	30	3	33.0	32.7	32.4	32.1
										4	44.0	43.6	43.2	42.8
985	30	792	872	952	*032	*112	*192	*272	29	5	55.0	54.5	54.0	53.5
985	31	8.42 272	351	430	510	589	667	746	28	6	66.0	65.4	64.8	64.2
984	32	746	825	903	982	*060	*138	*216	27	7	77.0	76.3	75.6	74.9
984	33	8.43 216	293	371	448	526	603	680	26	8	88.0	87.2	86.4	85.6
984	34	680	757	834	910	987	*063	*139	25	9	99.0	98.1	97.2	96.3
											106	105	104	103
983	35	8.44 139	216	292	367	443	519	594	24	1	10.6	10.5	10.4	10.3
983	36	594	669	745	820	895	969	*044	23	2	21.2	21.0	20.8	20.6
983	37	8.45 044	119	193	267	341	415	489	22	3	31.8	31.5	31.2	30.9
982	38	489	563	637	710	784	857	930	21	4	42.4	42.0	41.6	41.2
982	39	930	*003	*076	*149	*222	*294	*366	20	5	53.0	52.5	52.0	51.5
										6	63.6	63.0	62.4	61.8
982	40	8.46 366	439	511	583	655	727	799	19	7	74.2	73.5	72.8	72.1
981	41	799	870	942	*013	*084	*155	*226	18	8	84.8	84.0	83.2	82.4
981	42	8.47 226	297	368	439	509	580	650	17	9	95.4	94.5	93.6	92.7
981	43	650	720	790	860	930	*000	*069	16		102	101	100	99
980	44	8.48 069	139	208	278	347	416	485	15	1	10.2	10.1	10.0	9.9
										2	20.4	20.2	20.0	19.8
980	45	485	554	622	691	760	828	896	14	3	30.6	30.3	30.0	29.7
979	46	896	965	*033	*101	*169	*236	*304	13	4	40.8	40.4	40.0	39.6
979	47	8.49 304	372	439	506	574	641	708	12	5	51.0	50.5	50.0	49.5
979	48	708	775	842	908	975	*042	*108	11	6	61.2	60.6	60.0	59.4
978	49	8.50 108	174	241	307	373	439	504	10	7	71.4	70.7	70.0	69.3
										8	81.6	80.8	80.0	79.2
978	50	504	570	636	701	767	832	897	9	9	91.8	90.9	90.0	89.1
977	51	897	963	*028	*092	*157	*222	*287	8		98	97	96	95
977	52	8.51 287	351	416	480	544	609	673	7	1	9.8	9.7	9.6	9.5
977	53	673	737	801	864	928	992	*055	6	2	19.6	19.4	19.2	19.0
976	54	8.52 055	119	182	245	308	371	434	5	3	29.4	29.1	28.8	28.5
										4	39.2	38.8	38.4	38.0
976	55	434	497	560	623	685	748	810	4	5	49.0	48.5	48.0	47.5
975	56	810	872	935	997	*059	*121	*183	3	6	58.8	58.2	57.6	57.0
975	57	8.53 183	245	306	368	429	491	552	2	7	68.6	67.9	67.2	66.5
974	58	552	614	675	736	797	858	919	1	8	78.4	77.6	76.8	76.0
974	59	919	979	*040	*101	*161	*222	*282	0	9	88.2	87.3	86.4	85.5
9.99		60″	50″	40″	30″	20″	10″	0″	′	P	P

L Sin — *178° 268° *358° — 88° — L Cos

L Tan — 1° — *91° 181° *271°

′	0″	10″	20″	30″	40″	50″	60″	
0	8.24 192	313	433	553	672	791	910	59
1	910	*029	*147	*265	*382	*500	*616	58
2	8.25 616	733	849	965	*081	*196	*312	57
3	8.26 312	426	541	655	769	882	996	56
4	996	*109	*221	*334	*446	*558	*669	55
5	8.27 669	780	891	*002	*112	*223	*332	54
6	8.28 332	442	551	660	769	877	986	53
7	986	*094	*201	*309	*416	*523	*629	52
8	8.29 629	736	842	947	*053	*158	*263	51
9	8.30 263	368	473	577	681	785	888	50
10	888	992	*095	*198	*300	*403	*505	49
11	8.31 505	606	708	809	911	*012	*112	48
12	8.32 112	213	313	413	513	612	711	47
13	711	810	909	*008	*106	*205	*302	46
14	8.33 302	400	498	595	692	789	886	45
15	886	982	*078	*174	*270	*366	*461	44
16	8.34 461	556	651	746	840	935	*029	43
17	8.35 029	123	217	310	403	497	590	42
18	590	682	775	867	959	*051	*143	41
19	8.36 143	235	326	417	508	599	689	40
20	689	780	870	960	*050	*140	*229	39
21	8.37 229	318	408	497	585	674	762	38
22	762	850	938	*026	*114	*202	*289	37
23	8.38 289	376	463	550	636	723	809	36
24	809	895	981	*067	*153	*238	*323	35
25	8.39 323	408	493	578	663	747	832	34
26	832	916	*000	*083	*167	*250	*334	33
27	8.40 334	417	500	583	665	748	830	32
28	830	913	995	*077	*158	*240	*321	31
29	8.41 321	403	484	565	646	726	807	30
30	807	887	967	*048	*127	*207	*287	29
31	8.42 287	366	446	525	604	683	762	28
32	762	840	919	997	*073	*154	*232	27
33	8.43 232	309	387	464	542	619	696	26
34	696	773	850	927	*003	*080	*156	25
35	8.44 156	232	308	384	460	536	611	24
36	611	686	762	837	912	987	*061	23
37	8.45 061	136	210	285	359	433	507	22
38	507	581	655	728	802	875	948	21
39	948	*021	*094	*167	*240	*312	*385	20
40	8.46 385	457	529	602	674	745	817	19
41	817	889	960	*032	*103	*174	*245	18
42	8.47 245	316	387	458	528	599	669	17
43	669	740	810	880	950	*020	*089	16
44	8.48 089	159	228	298	367	436	505	15
45	505	574	643	711	780	849	917	14
46	917	985	*053	*121	*189	*257	*325	13
47	8.49 325	393	460	528	595	662	729	12
48	729	796	863	930	997	*063	*130	11
49	8.50 130	196	263	329	395	461	527	10
50	527	593	658	724	789	855	920	9
51	920	985	*050	*115	*180	*245	*310	8
52	8.51 310	374	439	503	568	632	696	7
53	696	760	824	888	952	*015	*079	6
54	8.52 079	143	206	269	332	396	459	5
55	459	522	584	647	710	772	835	4
56	835	897	960	*022	*084	*146	*208	3
57	8.53 208	270	332	393	455	516	578	2
58	578	639	700	762	823	884	945	1
59	945	*005	*066	*127	*187	*248	*308	0
	60″	50″	40″	30″	20″	10″	0″	′

*178° 268° *358° — 88° — L Cot

P P

	94	93	92	91	90
1	9.4	9.3	9.2	9.1	9.0
2	18.8	18.6	18.4	18.2	18.0
3	28.2	27.9	27.6	27.3	27.0
4	37.6	37.2	36.8	36.4	36.0
5	47.0	46.5	46.0	45.5	45.0
6	56.4	55.8	55.2	54.6	54.0
7	65.8	65.1	64.4	63.7	63.0
8	75.2	74.4	73.6	72.8	72.0
9	84.6	83.7	82.8	81.9	81.0

	89	88	87	86	85
1	8.9	8.8	8.7	8.6	8.5
2	17.8	17.6	17.4	17.2	17.0
3	26.7	26.4	26.1	25.8	25.5
4	35.6	35.2	34.8	34.4	34.0
5	44.5	44.0	43.5	43.0	42.5
6	53.4	52.8	52.2	51.6	51.0
7	62.3	61.6	60.9	60.2	59.5
8	71.2	70.4	69.6	68.8	68.0
9	80.1	79.2	78.3	77.4	76.5

	84	83	82	81	80
1	8.4	8.3	8.2	8.1	8.0
2	16.8	16.6	16.4	16.2	16.0
3	25.2	24.9	24.6	24.3	24.0
4	33.6	33.2	32.8	32.4	32.0
5	42.0	41.5	41.0	40.5	40.0
6	50.4	49.8	49.2	48.6	48.0
7	58.8	58.1	57.4	56.7	56.0
8	67.2	66.4	65.6	64.8	64.0
9	75.6	74.7	73.8	72.9	72.0

	79	78	77	76	75
1	7.9	7.8	7.7	7.6	7.5
2	15.8	15.6	15.4	15.2	15.0
3	23.7	23.4	23.1	22.8	22.5
4	31.6	31.2	30.8	30.4	30.0
5	39.5	39.0	38.5	38.0	37.5
6	47.4	46.8	46.2	45.6	45.0
7	55.3	54.6	53.9	53.2	52.5
8	63.2	62.4	61.6	60.8	60.0
9	71.1	70.2	69.3	68.4	67.5

	74	73	72	71	70
1	7.4	7.3	7.2	7.1	7.0
2	14.8	14.6	14.4	14.2	14.0
3	22.2	21.9	21.6	21.3	21.0
4	29.6	29.2	28.8	28.4	28.0
5	37.0	36.5	36.0	35.5	35.0
6	44.4	43.8	43.2	42.6	42.0
7	51.8	51.1	50.4	49 7	49.0
8	59.2	58.4	57.6	56.8	56.0
9	66.6	65.7	64.8	63.9	63.0

	69	68	67	66	65
1	6.9	6.8	6.7	6.6	6.5
2	13.8	13.6	13.4	13.2	13.0
3	20.7	20.4	20.1	19.8	19.5
4	27.6	27.2	26.8	26.4	26.0
5	34.5	34.0	33.5	33.0	32.5
6	41.4	40.8	40.2	39.6	39.0
7	48.3	47.6	46.9	46.2	45.5
8	55.2	54.4	53.6	52.8	52.0
9	62.1	61.2	60.3	59.4	58.5

	64	63	62	61	60
1	6.4	6.3	6.2	6.1	6.0
2	12.8	12.6	12.4	12.2	12.0
3	19.2	18.9	18.6	18.3	18.0
4	25.6	25.2	24.8	24.4	24.0
5	32.0	31.5	31.0	30.5	30.0
6	38.4	37.8	37.2	36.6	36.0
7	44.8	44.1	43.4	42.7	42.0
8	51.2	50.4	49.6	48.8	48.0
9	57.6	56.7	55.8	54.9	54.0

P P

L Cos L Sin 2° *92° 182° *272°

9.99	′	0″	10″	20″	30″	40″	50″	60″			P P
974	0	8.54 282	342	402	462	522	582	642	59	973	61
973	1	642	702	762	821	881	940	999	58	973	1 6.1
973	2	999	*059	*118	*177	*236	*295	*354	57	972	2 12.2
972	3	8.55 354	413	471	530	589	647	705	56	972	3 18.3
972	4	705	764	822	880	938	996	*054	55	971	4 24.4
971	5	8.56 054	112	170	227	285	342	400	54	971	5 30.5
971	6	400	457	515	572	629	686	743	53	970	6 36.6
970	7	743	800	857	914	970	*027	*084	52	970	7 42.7
970	8	8.57 084	140	196	253	309	365	421	51	969	8 48.8
969	9	421	477	533	589	645	701	757	50	969	9 54.9
969	10	757	812	868	923	979	*034	*089	49	968	60
968	11	8.58 089	144	200	255	310	364	419	48	968	1 6.0
968	12	419	474	529	583	638	693	747	47	967	2 12.0
967	13	747	801	856	910	964	*018	*072	46	967	3 18.0
967	14	8.59 072	126	180	234	288	341	395	45	967	4 24.0
967	15	395	448	502	555	609	662	715	44	966	5 30.0
966	16	715	768	821	874	927	980	*033	43	966	6 36.0
966	17	8.60 033	086	139	191	244	296	349	42	965	7 42.0
965	18	349	401	454	506	558	610	662	41	964	8 48.0
964	19	662	714	766	818	870	922	973	40	964	9 54.0
964	20	973	*025	*077	*128	*180	*231	*282	39	963	59
963	21	8.61 282	334	385	436	487	538	589	38	963	1 5.9
963	22	589	640	691	742	792	843	894	37	962	2 11.8
962	23	894	944	995	*045	*096	*146	*196	36	962	3 17.7
962	24	8.62 196	246	297	347	397	447	497	35	961	4 23.6
961	25	497	546	596	646	696	745	795	34	961	5 29.5
961	26	795	844	894	943	993	*042	*091	33	960	6 35.4
960	27	8.63 091	140	189	238	288	336	385	32	960	7 41.3
960	28	385	434	483	532	580	629	678	31	959	8 47.2
959	29	678	726	775	823	871	920	968	30	959	9 53.1
959	30	968	*016	*064	*112	*160	*208	*256	29	958	58
958	31	8.64 256	304	352	400	448	495	543	28	958	1 5.8
958	32	543	590	638	685	733	780	827	27	957	2 11.6
957	33	827	875	922	969	*016	*063	*110	26	956	3 17.4
956	34	8.65 110	157	204	251	298	344	391	25	956	4 23.2
956	35	391	438	484	531	577	624	670	24	955	5 29.0
955	36	670	717	763	809	855	901	947	23	955	6 34.8
955	37	947	994	*040	*085	*131	*177	*223	22	954	7 40.6
954	38	8.66 223	269	314	360	406	451	497	21	954	8 46.4
954	39	497	542	588	633	678	724	769	20	953	9 52.2
953	40	769	814	859	904	949	994	*039	19	952	57
952	41	8.67 039	084	129	174	219	263	308	18	952	1 5.7
952	42	308	353	397	442	486	531	575	17	951	2 11.4
951	43	575	619	664	708	752	796	841	16	951	3 17.1
951	44	841	885	929	973	*017	*060	*104	15	950	4 22.8
950	45	8.68 104	148	192	236	279	323	367	14	949	5 28.5
949	46	367	410	454	497	540	584	627	13	949	6 34.2
949	47	627	670	714	757	800	843	886	12	948	7 39.9
948	48	886	929	972	*015	*058	*101	*144	11	948	8 45.6
948	49	8.69 144	187	229	272	315	357	400	10	947	9 51.3
947	50	400	442	485	527	570	612	654	9	946	56
946	51	654	697	739	781	823	865	907	8	946	1 5.6
946	52	907	949	991	*033	*075	*117	*159	7	945	2 11.2
945	53	8.70 159	201	242	284	326	367	409	6	944	3 16.8
944	54	409	451	492	534	575	616	658	5	944	4 22.4
944	55	658	699	740	781	823	864	905	4	943	5 28.0
943	56	905	946	987	*028	*069	*110	*151	3	942	6 33.6
942	57	8.71 151	192	232	273	314	355	395	2	942	7 39.2
942	58	395	436	476	517	557	598	638	1	941	8 44.8
941	59	638	679	719	759	800	840	880	0	940	9 50.4
		60″	50″	40″	30″	20″	10″	0″		9.99	P P

*177° 267° *357° 87° L Cos L Sin

L Tan 2° *92° 182° *272°

	0″	10″	20″	30″	40″	50″	60″	
0	8.54 308	369	429	489	549	609	669	59
1	669	729	789	848	908	967	*027	58
2	8.55 027	086	145	205	264	323	382	57
3	382	441	499	558	617	675	734	56
4	734	792	850	909	967	*025	*083	55
5	8.56 083	141	199	256	314	372	429	54
6	429	487	544	601	659	716	773	53
7	773	830	887	944	*000	*057	*114	52
8	8.57 114	170	227	283	340	396	452	51
9	452	508	564	620	676	732	788	50
10	788	843	899	955	*010	*065	*121	49
11	8.58 121	176	231	286	341	396	451	48
12	451	506	561	616	670	725	779	47
13	779	834	888	943	997	*051	*105	46
14	8.59 105	159	213	267	321	375	428	45
15	428	482	536	589	642	696	749	44
16	749	802	856	909	962	*015	*068	43
17	8.60 068	121	173	226	279	331	384	42
18	384	436	489	541	593	646	698	41
19	698	750	802	854	906	958	*009	40
20	8.61 009	061	113	164	216	267	319	39
21	319	370	422	473	524	575	626	38
22	626	677	728	779	830	881	931	37
23	931	982	*033	*083	*134	*184	*234	36
24	8.62 234	285	335	385	435	485	535	35
25	535	585	635	685	735	784	834	34
26	834	884	933	983	*032	*081	*131	33
27	8.63 131	180	229	278	328	377	426	32
28	426	475	523	572	621	670	718	31
29	718	767	816	864	913	961	*009	30
30	8.64 009	058	106	154	202	250	298	29
31	298	346	394	442	490	538	585	28
32	585	633	681	728	776	823	870	27
33	870	918	965	*012	*060	*107	*154	26
34	8.65 154	201	248	295	342	388	435	25
35	435	482	529	575	622	668	715	24
36	715	761	808	854	900	947	993	23
37	993	*039	*085	*131	*177	*223	*269	22
38	8.66 269	315	361	406	452	498	543	21
39	543	589	634	680	725	771	816	20
40	816	861	906	952	997	*042	*087	19
41	8.67 087	132	177	222	267	312	356	18
42	356	401	446	490	535	579	624	17
43	624	668	713	757	801	846	890	16
44	890	934	978	*022	*066	*110	*154	15
45	8.68 154	198	242	286	330	373	417	14
46	417	461	504	548	592	635	678	13
47	678	722	765	808	852	895	938	12
48	938	981	*024	*067	*110	*153	*196	11
49	8.69 196	239	282	325	368	410	453	10
50	453	496	538	581	623	666	708	9
51	708	750	793	835	877	920	962	8
52	962	*004	*046	*088	*130	*172	*214	7
53	8.70 214	256	298	339	381	423	465	6
54	465	506	548	589	631	673	714	5
55	714	755	797	838	879	921	962	4
56	962	*003	*044	*085	*126	*167	*208	3
57	8.71 208	249	290	331	372	413	453	2
58	453	494	535	575	616	657	697	1
59	697	738	778	819	859	899	940	0
	60″	50″	40″	30″	20″	10″	0″	′

*177° 267° *357° 87° L Cot

P P

	55	54	53
1	5.5	5.4	5.3
2	11.0	10.8	10.6
3	16.5	16.2	15.9
4	22.0	21.6	21.2
5	27.5	27.0	26.5
6	33.0	32.4	31.8
7	38.5	37.8	37.1
8	44.0	43.2	42.4
9	49.5	48.6	47.7

	52	51
1	5.2	5.1
2	10.4	10.2
3	15.6	15.3
4	20.8	20.4
5	26.0	25.5
6	31.2	30.6
7	36.4	35.7
8	41.6	40.8
9	46.8	45.9

	50	49	48
1	5.0	4.9	4.8
2	10.0	9 8	9.6
3	15.0	14.7	14.4
4	20.0	19.6	19.2
5	25.0	24.5	24.0
6	30.0	29.4	28.8
7	35.0	34.3	33.6
8	40.0	39.2	38.4
9	45.0	44.1	43.2

	47	46	45
1	4.7	4.6	4.5
2	9.4	9.2	9.0
3	14.1	13.8	13.5
4	18.8	18.4	18.0
5	23.5	23.0	22.5
6	28.2	27.6	27.0
7	32.9	32.2	31.5
8	37.6	36.8	36.0
9	42.3	41.4	40.5

	44	43
1	4.4	4.3
2	8.8	8.6
3	13.2	12.9
4	17.6	17.2
5	22.0	21.5
6	26.4	25.8
7	30.8	30.1
8	35.2	34.4
9	39.6	38.7

	42	41	40
1	4.2	4.1	4.0
2	8.4	8.2	8.0
3	12.6	12.3	12.0
4	16.8	16.4	16.0
5	21.0	20.5	20.0
6	25.2	24.6	24.0
7	29.4	28.7	28.0
8	33.6	32.8	32.0
9	37.8	36.9	36.0

P P

L Cos L Sin 3° *93° 183° *273°

9.99		0″	10″	20″	30″	40″	50″	60″			P	P
940	0	8.71 880	920	960	*000	*040	*080	*120	59	940	40	39
940	1	8.72 120	160	200	240	280	320	359	58	939	1 4.0	3.9
939	2	359	399	439	478	518	558	597	57	938	2 8.0	7.8
938	3	597	637	676	716	755	794	834	56	938	3 12.0	11.7
938	4	834	873	912	951	991	*030	*069	55	937	4 16.0	15.6
937	5	8.73 069	108	147	186	225	264	303	54	936	5 20.0	19.5
936	6	303	342	380	419	458	497	535	53	936	6 24.0	23.4
936	7	535	574	613	651	690	728	767	52	935	7 28.0	27.3
935	8	767	805	844	882	920	959	997	51	934	8 32.0	31.2
934	9	997	*035	*073	*112	*150	*188	*226	50	934	9 36.0	35.1
934	10	8.74 226	264	302	340	378	416	454	49	933	38	37
933	11	454	491	529	567	605	642	680	48	932	1 3.8	3.7
932	12	680	718	755	793	831	868	906	47	932	2 7.6	7.4
932	13	906	943	980	*018	*055	*092	*130	46	931	3 11.4	11.1
931	14	8.75 130	167	204	241	279	316	353	45	930	4 15.2	14.8
930	15	353	390	427	464	501	538	575	44	929	5 19.0	18.5
929	16	575	612	648	685	722	759	795	43	929	6 22.8	22.2
929	17	795	832	869	905	942	979	*015	42	928	7 26.6	25.9
928	18	8.76 015	052	088	125	161	197	234	41	927	8 30.4	29.6
927	19	234	270	306	343	379	415	451	40	926	9 34.2	33.3
926	20	451	487	523	559	595	631	667	39	926	36	
926	21	667	703	739	775	811	847	883	38	925	1 3.6	
925	22	883	919	954	990	*026	*061	*097	37	924	2 7.2	
924	23	8.77 097	133	168	204	239	275	310	36	923	3 10.8	
923	24	310	346	381	416	452	487	522	35	923	4 14.4	
923	25	522	558	593	628	663	698	733	34	922	5 18.0	
922	26	733	768	803	838	873	908	943	33	921	6 21.6	
921	27	943	978	*013	*048	*083	*118	*152	32	920	7 25.2	
920	28	8.78 152	187	222	257	291	326	360	31	920	8 28.8	
920	29	360	395	430	464	499	533	568	30	919	9 32.4	
919	30	568	602	636	671	705	739	774	29	918	35	34
918	31	774	808	842	876	910	945	979	28	917	1 3.5	3.4
917	32	979	*013	*047	*081	*115	*149	*183	27	917	2 7.0	6.8
917	33	8.79 183	217	251	284	318	352	386	26	916	3 10.5	10.2
916	34	386	420	453	487	521	555	588	25	915	4 14.0	13.6
915	35	588	622	655	689	722	756	789	24	914	5 17.5	17.0
914	36	789	823	856	890	923	956	990	23	913	6 21.0	20.4
913	37	990	*023	*056	*090	*123	*156	*189	22	913	7 24.5	23.8
913	38	8.80 189	222	255	289	322	355	388	21	912	8 28.0	27.2
912	39	388	421	454	487	519	552	585	20	911	9 31.5	30.6
911	40	585	618	651	684	716	749	782	19	910	33	32
910	41	782	815	847	880	913	945	978	18	909	1 3.3	3.2
909	42	978	*010	*043	*075	*108	*140	*173	17	909	2 6.6	6.4
909	43	8.81 173	205	237	270	302	334	367	16	908	3 9.9	9.6
908	44	367	399	431	463	496	528	560	15	907	4 13.2	12.8
907	45	560	592	624	656	688	720	752	14	906	5 16.5	16.0
906	46	752	784	816	848	880	912	944	13	905	6 19.8	19.2
905	47	944	975	*007	*039	*071	*103	*134	12	904	7 23.1	22.4
904	48	8.82 134	166	198	229	261	292	324	11	904	8 26.4	25.6
904	49	324	356	387	419	450	482	513	10	903	9 29.7	28.8
903	50	513	544	576	607	639	670	701	9	902	31	30
902	51	701	732	764	795	826	857	888	8	901	1 3.1	3.0
901	52	888	920	951	982	*013	*044	*075	7	900	2 6.2	6.0
900	53	8.83 075	106	137	168	199	230	261	6	899	3 9.3	9.0
899	54	261	292	322	353	384	415	446	5	898	4 12.4	12.0
898	55	446	476	507	538	568	599	630	4	898	5 15.5	15.0
898	56	630	660	691	721	752	783	813	3	897	6 18.6	18.0
897	57	813	844	874	904	935	965	996	2	896	7 21.7	21.0
896	58	996	*026	*056	*087	*117	*147	*177	1	895	8 24.8	24.0
895	59	8.84 177	208	238	268	298	328	358	0	894	9 27.9	27.0
		60″	50″	40″	30″	20″	10″	0″		9.99	P	P

*176° 266° *356° 86° L Cos L Sin

L Tan 3° *93° 183° *273°

′	0″	10″	20″	30″	40″	50″	60″	
0	8.71 940	980	*020	*060	*100	*141	*181	59
1	8.72 181	221	261	301	341	380	420	58
2	420	460	500	540	579	619	659	57
3	659	698	738	777	817	856	896	56
4	896	935	975	*014	*053	*093	*132	55
5	8.73 132	171	210	249	288	327	366	54
6	366	405	444	483	522	561	600	53
7	600	638	677	716	754	793	832	52
8	832	870	909	947	986	*024	*063	51
9	8.74 063	101	139	178	216	254	292	50
10	292	330	369	407	445	483	521	49
11	521	559	597	634	672	710	748	48
12	748	786	823	861	899	936	974	47
13	974	*012	*049	*087	*124	*162	*199	46
14	8.75 199	236	274	311	348	385	423	45
15	423	460	497	534	571	608	645	44
16	645	682	719	756	793	830	867	43
17	867	904	940	977	*014	*051	*087	42
18	8.76 087	124	160	197	233	270	306	41
19	306	343	379	416	452	488	525	40
20	525	561	597	633	669	706	742	39
21	742	778	814	850	886	922	958	38
22	958	994	*030	*065	*101	*137	*173	37
23	8.77 173	208	244	280	315	351	387	36
24	387	422	458	493	529	564	600	35
25	600	635	670	706	741	776	811	34
26	811	847	882	917	952	987	*022	33
27	8.78 022	057	092	127	162	197	232	32
28	232	267	302	337	371	406	441	31
29	441	475	510	545	579	614	649	30
30	649	683	718	752	787	821	855	29
31	855	890	924	958	993	*027	*061	28
32	8.79 061	096	130	164	198	232	266	27
33	266	300	334	368	402	436	470	26
34	470	504	538	572	606	639	673	25
35	673	707	741	774	808	842	875	24
36	875	909	942	976	*009	*043	*076	23
37	8.80 076	110	143	177	210	243	277	22
38	277	310	343	376	409	443	476	21
39	476	509	542	575	608	641	674	20
40	674	707	740	773	806	839	872	19
41	872	905	937	970	*003	*036	*068	18
42	8.81 068	101	134	166	199	232	264	17
43	264	297	329	362	394	427	459	16
44	459	491	524	556	588	621	653	15
45	653	685	717	750	782	814	846	14
46	846	878	910	942	974	*006	*038	13
47	8.82 038	070	102	134	166	198	230	12
48	230	262	293	325	357	389	420	11
49	420	452	484	515	547	579	610	10
50	610	642	673	705	736	768	799	9
51	799	831	862	893	925	956	987	8
52	987	*019	*050	*081	*112	*144	*175	7
53	8.83 175	206	237	268	299	330	361	6
54	361	392	423	454	485	516	547	5
55	547	578	609	640	671	701	732	4
56	732	763	794	824	855	886	916	3
57	916	947	978	*008	*039	*069	*100	2
58	8.84 100	130	161	191	222	252	282	1
59	282	313	343	374	404	434	464	0
	60″	50″	40″	30″	20″	10″	0″	

P	P
	41 | 40
1	4.1 | 4.0
2	8.2 | 8.0
3	12.3 | 12.0
4	16.4 | 16.0
5	20.5 | 20.0
6	24.6 | 24.0
7	28.7 | 28.0
8	32.8 | 32.0
9	36.9 | 36.0
	39 | 38
1	3.9 | 3.8
2	7.8 | 7.6
3	11.7 | 11.4
4	15.6 | 15.2
5	19.5 | 19.0
6	23.4 | 22.8
7	27.3 | 26.6
8	31.2 | 30.4
9	35.1 | 34.2
	37 | 36
1	3.7 | 3.6
2	7.4 | 7 2
3	11.1 | 10.8
4	14.8 | 14.4
5	18.5 | 18.0
6	22.2 | 21.6
7	25.9 | 25.2
8	29.6 | 28.8
9	33.3 | 32.4
	35 | 34
1	3.5 | 3.4
2	7.0 | 6.8
3	10.5 | 10.2
4	14.0 | 13.6
5	17.5 | 17.0
6	21.0 | 20.4
7	24.5 | 23.8
8	28.0 | 27.2
9	31.5 | 30.6
	33 | 32
1	3.3 | 3.2
2	6.6 | 6.4
3	9.9 | 9.6
4	13.2 | 12.8
5	16.5 | 16.0
6	19.8 | 19.2
7	23.1 | 22.4
8	26.4 | 25.6
9	29.7 | 28.8
	31 | 30
1	3.1 | 3.0
2	6.2 | 6.0
3	9.3 | 9.0
4	12.4 | 12.0
5	15.5 | 15.0
6	18.6 | 18.0
7	21.7 | 21.0
8	24.8 | 24.0
9	27.9 | 27.0

P P

*176° 266° *356° 86° L Cot

L Cos L Sin 4° *94° 184° *274°

9.99	′	0″	10″	20″	30″	40″	50″	60″			P	P
894	0	8.84 358	389	419	449	479	509	539	59	893		
893	1	539	569	599	629	659	688	718	58	892		
892	2	718	748	778	808	838	867	897	57	891		31	30
891	3	897	927	957	986	*016	*045	*075	56	891	1	3.1	3.0
891	4	8.85 075	105	134	164	193	223	252	55	890	2	6.2	6.0
890	5	252	282	311	341	370	400	429	54	889	3	9.3	9.0
889	6	429	458	488	517	546	576	605	53	888	4	12.4	12.0
888	7	605	634	663	693	722	751	780	52	887	5	15.5	15.0
887	8	780	809	838	867	896	926	955	51	886	6	18.6	18.0
886	9	955	984	*013	*042	*070	*099	*128	50	885	7	21.7	21.0
885	10	8.86 128	157	186	215	244	273	301	49	884	8	24.8	24.0
884	11	301	330	359	388	416	445	474	48	883	9	27.9	27.0
883	12	474	502	531	560	588	617	645	47	882			
882	13	645	674	703	731	760	788	816	46	881			
881	14	816	845	873	902	930	958	987	45	880		29	
880	15	987	*015	*043	*072	*100	*128	*156	44	879	1	2.9	
879	16	8.87 156	185	213	241	269	297	325	43	879	2	5.8	
879	17	325	354	382	410	438	466	494	42	878	3	8.7	
878	18	494	522	550	578	606	634	661	41	877	4	11.6	
877	19	661	689	717	745	773	801	829	40	876	5	14.5	
876	20	829	856	884	912	940	967	995	39	875	6	17.4	
875	21	995	*023	*050	*078	*106	*133	*161	38	874	7	20.3	
874	22	8.88 161	188	216	243	271	298	326	37	873	8	23.2	
873	23	326	353	381	408	436	463	490	36	872	9	26.1	
872	24	490	518	545	572	600	627	654	35	871			
871	25	654	681	709	736	763	790	817	34	870		28	27
870	26	817	845	872	899	926	953	980	33	869	1	2.8	2.7
869	27	980	*007	*034	*061	*088	*115	*142	32	868	2	5.6	5.4
868	28	8.89 142	169	196	223	250	277	304	31	867	3	8.4	8.1
867	29	304	330	357	384	411	438	464	30	866	4	11.2	10.8
866	30	464	491	518	545	571	598	625	29	865	5	14.0	13.5
865	31	625	651	678	704	731	758	784	28	864	6	16.8	16.2
864	32	784	811	837	864	890	917	943	27	863	7	19.6	18.9
863	33	943	970	996	*023	*049	*075	*102	26	862	8	22.4	21.6
862	34	8.90 102	128	154	181	207	233	260	25	861	9	25.2	24.3
861	35	260	286	312	338	364	391	417	24	860			
860	36	417	443	469	495	521	548	574	23	859			
859	37	574	600	626	652	678	704	730	22	858		26	
858	38	730	756	782	808	834	859	885	21	857	1	2.6	
857	39	885	911	937	963	989	*015	*040	20	856	2	5.2	
856	40	8.91 040	066	092	118	143	169	195	19	855	3	7.8	
855	41	195	221	246	272	298	323	349	18	854	4	10.4	
854	42	349	374	400	426	451	477	502	17	853	5	13.0	
853	43	502	528	553	579	604	630	655	16	852	6	15.6	
852	44	655	680	706	731	757	782	807	15	851	7	18.2	
851	45	807	833	858	883	909	934	959	14	850	8	20.8	
850	46	959	984	*010	*035	*060	*085	*110	13	848	9	23.4	
848	47	8.92 110	135	161	186	211	236	261	12	847			
847	48	261	286	311	336	361	386	411	11	846			
846	49	411	436	461	486	511	536	561	10	845		25	24
845	50	561	586	611	636	660	685	710	9	844	1	2.5	2.4
844	51	710	735	760	784	809	834	859	8	843	2	5.0	4.8
843	52	859	883	908	933	957	982	*007	7	842	3	7.5	7.2
842	53	8.93 007	031	056	081	105	130	154	6	841	4	10.0	9.6
841	54	154	179	203	228	253	277	301	5	840	5	12.5	12.0
840	55	301	326	350	375	399	424	448	4	839	6	15.0	14.4
839	56	448	472	497	521	546	570	594	3	838	7	17.5	16.8
838	57	594	619	643	667	691	716	740	2	837	8	20.0	19.2
837	58	740	764	788	812	837	861	885	1	836	9	22.5	21.6
836	59	885	909	933	957	981	*006	*030	0	834			
		60″	50″	40″	30″	20″	10″	0″	′	9.99	P	P

*175° 265° *355° 85° L Cos L Sin

L Tan 4° *94° 184° *274°

′	0″	10″	20″	30″	40″	50″	60″		P P
0	8.84 464	495	525	555	585	615	646	59	
1	646	676	706	736	766	796	826	58	
2	826	856	886	916	946	976	*006	57	31 30
3	8.85 006	036	065	095	125	155	185	56	1 3.1 3.0
4	185	214	244	274	304	333	363	55	2 6.2 6.0
5	363	392	422	452	481	511	540	54	3 9.3 9.0
6	540	570	599	629	658	688	717	53	4 12.4 12.0
7	717	747	776	805	835	864	893	52	5 15.5 15.0
8	893	922	952	981	*010	*039	*069	51	6 18.6 18.0
9	8.86 069	098	127	156	185	214	243	50	7 21.7 21.0
									8 24.8 24.0
10	243	272	301	330	359	388	417	49	9 27.9 27.0
11	417	447	475	504	533	562	591	48	
12	591	619	648	677	706	734	763	47	
13	763	792	821	849	878	907	935	46	
14	935	964	992	*021	*049	*078	*106	45	29
									1 2.9
15	8.87 106	135	163	192	220	249	277	44	2 5.8
16	277	305	334	362	390	419	447	43	3 8.7
17	447	475	503	532	560	588	616	42	4 11.6
18	616	644	673	701	729	757	785	41	5 14.5
19	785	813	841	869	897	925	953	40	6 17.4
									7 20.3
20	953	981	*009	*037	*065	*092	*120	39	8 23.2
21	8.88 120	148	176	204	231	259	287	38	9 26.1
22	287	315	342	370	398	425	453	37	
23	453	481	508	536	563	591	618	36	
24	618	646	674	701	728	756	783	35	
									28 27
25	783	811	838	866	893	920	948	34	1 2.8 2.7
26	948	975	*002	*029	*057	*084	111	33	2 5.6 5.4
27	8.89 111	138	166	193	220	247	274	32	3 8.4 8.1
28	274	301	328	355	383	410	437	31	4 11.2 10.8
29	437	464	491	518	545	571	598	30	5 14.0 13.5
									6 16.8 16.2
30	598	625	652	679	706	733	760	29	7 19.6 18.9
31	760	786	813	840	867	894	920	28	8 22.4 21.6
32	920	947	974	*000	*027	*054	*080	27	9 25.2 24.3
33	8.90 080	107	134	160	187	213	240	26	
34	240	266	293	319	346	372	399	25	
35	399	425	451	478	504	531	557	24	
36	557	583	610	636	662	688	715	23	
37	715	741	767	793	820	846	872	22	26
38	872	898	924	950	976	*002	*029	21	1 2.6
39	8.91 029	055	081	107	133	159	185	20	2 5.2
									3 7.8
40	185	211	236	262	288	314	340	19	4 10.4
41	340	366	392	418	443	469	495	18	5 13.0
42	495	521	547	572	598	624	650	17	6 15.6
43	650	675	701	727	752	778	803	16	7 18.2
44	803	829	855	880	906	931	957	15	8 20.8
									9 23.4
45	957	982	*008	*033	*059	*084	*110	14	
46	8.92 110	135	160	186	211	237	262	13	
47	262	287	313	338	363	388	414	12	
48	414	439	464	489	515	540	565	11	
49	565	590	615	640	665	691	716	10	
									25 24
50	716	741	766	791	816	841	866	9	1 2.5 2.4
51	866	891	916	941	966	991	*016	8	2 5.0 4.8
52	8.93 016	040	065	090	115	140	165	7	3 7.5 7.2
53	165	190	214	239	264	289	313	6	4 10.0 9.6
54	313	338	363	388	412	437	462	5	5 12.5 12.0
									6 15.0 14.4
55	462	486	511	536	560	585	609	4	7 17.5 16.8
56	609	634	658	683	707	732	756	3	8 20.0 19.2
57	756	781	805	830	854	879	903	2	9 22.5 21.6
58	903	928	952	976	*001	*025	*049	1	
59	8.94 049	074	098	122	147	171	195	0	
	60″	50″	40″	30″	20″	10″	0″	′	P P

*175° 265° *355° 85° L Cot

9.99	′	0″	10″	20″	30″	40″	50″	60″			P	P
834	0	8.94 030	054	078	102	126	150	174	59	833		
833	1	174	198	222	246	270	294	317	58	832		
832	2	317	341	365	389	413	437	461	57	831		24
831	3	461	484	508	532	556	580	603	56	830	1	2.4
830	4	603	627	651	675	698	722	746	55	829	2	4.8
829	5	746	769	793	817	840	864	887	54	828	3	7.2
828	6	887	911	935	958	982	*005	*029	53	827	4	9.6
827	7	8.95 029	052	076	099	123	146	170	52	825	5	12.0
825	8	170	193	216	240	263	287	310	51	824	6	14.4
824	9	310	333	357	380	403	427	450	50	823	7	16.8
											8	19.2
823	10	450	473	496	520	543	566	589	49	822	9	21.6
822	11	589	613	636	659	682	705	728	48	821		
821	12	728	752	775	798	821	844	867	47	820		
820	13	867	890	913	936	959	982	*005	46	819		23
819	14	8.96 005	028	051	074	097	120	143	45	817	1	2.3
817	15	143	166	189	212	234	257	280	44	816	2	4.6
816	16	280	303	326	349	371	394	417	43	815	3	6.9
815	17	417	440	462	485	508	531	553	42	814	4	9.2
814	18	553	576	599	621	644	667	689	41	813	5	11.5
813	19	689	712	735	757	780	802	825	40	812	6	13.8
											7	16.1
812	20	825	847	870	892	915	937	960	39	810	8	18.4
810	21	960	982	*005	*027	*050	*072	*095	38	809	9	20.7
809	22	8.97 095	117	139	162	184	207	229	37	808		
808	23	229	251	274	296	318	341	363	36	807		
807	24	363	385	407	430	452	474	496	35	806		22
806	25	496	518	541	563	585	607	629	34	804	1	2.2
804	26	629	651	674	696	718	740	762	33	803	2	4.4
803	27	762	784	806	828	850	872	894	32	802	3	6.6
802	28	894	916	938	960	982	*004	*026	31	801	4	8.8
801	29	8.98 026	048	070	092	114	135	157	30	800	5	11.0
800	30	157	179	201	223	245	266	288	29	798	6	13.2
798	31	288	310	332	354	375	397	419	28	797	7	15.4
797	32	419	441	462	484	506	527	549	27	796	8	17.6
796	33	549	571	592	614	636	657	679	26	795	9	19.8
795	34	679	701	722	744	765	787	808	25	793		
793	35	808	830	851	873	894	916	937	24	792		
792	36	937	959	980	*002	*023	*045	*066	23	791		21
791	37	8.99 066	087	109	130	152	173	194	22	790	1	2.1
790	38	194	216	237	258	280	301	322	21	788	2	4.2
788	39	322	343	365	386	407	428	450	20	787	3	6.3
787	40	450	471	492	513	534	556	577	19	786	4	8.4
786	41	577	598	619	640	661	682	704	18	785	5	10.5
785	42	704	725	746	767	788	809	830	17	783	6	12.6
783	43	830	851	872	893	914	935	956	16	782	7	14.7
782	44	956	977	998	*019	*040	*061	*082	15	781	8	16.8
781	45	9.00 082	103	123	144	165	186	207	14	780	9	18.9
780	46	207	228	249	269	290	311	332	13	778		
778	47	332	353	373	394	415	436	456	12	777		
777	48	456	477	498	518	539	560	581	11	776		20
776	49	581	601	622	642	663	684	704	10	775	1	2.0
775	50	704	725	746	766	787	807	828	9	773	2	4.0
773	51	828	848	869	889	910	930	951	8	772	3	6.0
772	52	951	971	992	*012	*033	*053	*074	7	771	4	8.0
771	53	9.01 074	094	115	135	155	176	196	6	769	5	10.0
769	54	196	217	237	257	278	298	318	5	768	6	12.0
768	55	318	339	359	379	399	420	440	4	767	7	14.0
767	56	440	460	480	501	521	541	561	3	765	8	16.0
765	57	561	582	602	622	642	662	682	2	764	9	18.0
764	58	682	703	723	743	763	783	803	1	763		
763	59	803	823	843	863	883	903	923	0	761		
		60″	50″	40″	30″	20″	10″	0″		9.99	P	P

L Tan 5° *95° 185° *275°

′	0″	10″	20″	30″	40″	50″	60″		P	P
0	8.94 195	219	244	268	292	316	340	59		
1	340	365	389	413	437	461	485	58		25
2	485	509	533	557	581	606	630	57	1	2.5
3	630	654	678	702	725	749	773	56	2	5.0
4	773	797	821	845	869	893	917	55	3	7.5
5	917	941	964	988	*012	*036	*060	54	4	10.0
6	8.95 060	083	107	131	155	178	202	53	5	12.5
7	202	226	249	273	297	320	344	52	6	15.0
8	344	368	391	415	439	462	486	51	7	17.5
9	486	509	533	556	580	603	627	50	8	20.0
10	627	650	674	697	721	744	767	49	9	22.5
11	767	791	814	838	861	884	908	48		24
12	908	931	954	977	*001	*024	*047	47	1	2.4
13	8.96 047	071	094	117	140	163	187	46	2	4.8
14	187	210	233	256	279	302	325	45	3	7.2
15	325	349	372	395	418	441	464	44	4	9.6
16	464	487	510	533	556	579	602	43	5	12.0
17	602	625	648	671	694	717	739	42	6	14.4
18	739	762	785	808	831	854	877	41	7	16.8
19	877	899	922	945	968	991	*013	40	8	19.2
20	8.97 013	036	059	081	104	127	150	39	9	21.6
21	150	172	195	218	240	263	285	38		23
22	285	308	331	353	376	398	421	37	1	2.3
23	421	443	466	488	511	533	556	36	2	4.6
24	556	578	601	623	646	668	691	35	3	6.9
25	691	713	735	758	780	802	825	34	4	9.2
26	825	847	869	892	914	936	959	33	5	11.5
27	959	981	*003	*025	*048	*070	*092	32	6	13.8
28	8.98 092	114	136	159	181	203	225	31	7	16.1
29	225	247	269	291	314	336	358	30	8	18.4
30	358	380	402	424	446	468	490	29	9	20.7
31	490	512	534	556	578	600	622	28		22
32	622	644	666	687	709	731	753	27	1	2.2
33	753	775	797	819	841	862	884	26	2	4.4
34	884	906	928	950	971	993	*015	25	3	6.6
35	8.99 015	037	058	080	102	123	145	24	4	8.8
36	145	167	188	210	232	253	275	23	5	11.0
37	275	297	318	340	361	383	405	22	6	13.2
38	405	426	448	469	491	512	534	21	7	15.4
39	534	555	577	598	620	641	662	20	8	17.6
40	662	684	705	727	748	769	791	19	9	19.8
41	791	812	834	855	876	898	919	18		21
42	919	940	961	983	*004	*025	*046	17	1	2.1
43	9.00 046	068	089	110	131	153	174	16	2	4.2
44	174	195	216	237	258	280	301	15	3	6.3
45	301	322	343	364	385	406	427	14	4	8.4
46	427	448	469	490	511	532	553	13	5	10.5
47	553	574	595	616	637	658	679	12	6	12.6
48	679	700	721	742	763	784	805	11	7	14.7
49	805	826	846	867	888	909	930	10	8	16.8
50	930	951	971	992	*013	*034	*055	9	9	18.9
51	9.01 055	075	096	117	138	158	179	8		20
52	179	200	220	241	262	282	303	7	1	2.0
53	303	324	344	365	386	406	427	6	2	4.0
54	427	447	468	489	509	530	550	5	3	6.0
55	550	571	591	612	632	653	673	4	4	8.0
56	673	694	714	735	755	776	796	3	5	10.0
57	796	816	837	857	878	898	918	2	6	12.0
58	918	939	959	979	*000	*020	*040	1	7	14.0
59	9.02 040	061	081	101	121	142	162	0	8	16.0
									9	18.0
	60″	50″	40″	30″	20″	10″	0″	′	P	P

*174° 264° *354° 84° L Cot

9.99	′	0″	10″	20″	30″	40″	50″	60″			P	P
761	0	9.01 923	943	964	984	*004	*024	*043	59	760		
760	1	9.02 043	063	083	103	123	143	163	58	759		
759	2	163	183	203	223	243	263	283	57	757		21
757	3	283	302	322	342	362	382	402	56	756	1	2.1
756	4	402	421	441	461	481	501	520	55	755	2	4.2
755	5	520	540	560	579	599	619	639	54	753	3	6.3
753	6	639	658	678	698	717	737	757	53	752	4	8.4
752	7	757	776	796	816	835	855	874	52	751	5	10.5
751	8	874	894	914	933	953	972	992	51	749	6	12.6
749	9	992	*011	*031	*050	*070	*089	*109	50	748	7	14.7
											8	16.8
748	10	9.03 109	128	148	167	187	206	226	49	747	9	18.9
747	11	226	245	265	284	303	323	342	48	745		
745	12	342	361	381	400	420	439	458	47	744		
744	13	458	478	497	516	535	555	574	46	742		20
742	14	574	593	613	632	651	670	690	45	741	1	2.0
741	15	690	709	728	747	766	786	805	44	740	2	4.0
740	16	805	824	843	862	881	901	920	43	738	3	6.0
738	17	920	939	958	977	996	*015	*034	42	737	4	8.0
737	18	9.04 034	053	072	091	110	129	149	41	736	5	10.0
736	19	149	168	187	206	225	244	262	40	734	6	12.0
											7	14.0
734	20	262	281	300	319	338	357	376	39	733	8	16.0
733	21	376	395	414	433	452	471	490	38	731	9	18.0
731	22	490	508	527	546	565	584	603	37	730		
730	23	603	621	640	659	678	697	715	36	728		
728	24	715	734	753	772	790	809	828	35	727		19
727	25	828	847	565	884	903	921	940	34	726	1	1.9
726	26	940	959	977	996	*015	*033	*052	33	724	2	3.8
724	27	9.05 052	071	089	108	126	145	164	32	723	3	5.7
723	28	164	182	201	219	238	256	275	31	721	4	7.6
721	29	275	293	312	330	349	367	386	30	720	5	9.5
720	30	386	404	423	441	460	478	497	29	718	6	11.4
718	31	497	515	533	552	570	589	607	28	717	7	13.3
717	32	607	625	644	662	681	699	717	27	716	8	15.2
716	33	717	736	754	772	791	809	827	26	714	9	17.1
714	34	827	845	864	882	900	918	937	25	713		
713	35	937	955	973	991	*010	*028	*046	24	711		
711	36	9.06 046	064	082	101	119	137	155	23	710		18
710	37	155	173	191	210	228	246	264	22	708	1	1.8
708	38	264	282	300	318	336	354	372	21	707	2	3.6
707	39	372	390	408	426	445	463	481	20	705	3	5.4
705	40	481	499	517	535	553	571	589	19	704	4	7.2
704	41	589	606	624	642	660	678	696	18	702	5	9.0
702	42	696	714	732	750	768	786	804	17	701	6	10.8
701	43	804	821	839	857	875	893	911	16	699	7	12.6
699	44	911	929	946	964	982	*000	*018	15	698	8	14.4
698	45	9.07 018	035	053	071	089	106	124	14	696	9	16.2
696	46	124	142	160	177	195	213	231	13	695		
695	47	231	248	266	284	301	319	337	12	693		
693	48	337	354	372	390	407	425	442	11	692		17
692	49	442	460	478	495	513	530	548	10	690	1	1.7
690	50	548	566	583	601	618	636	653	9	689	2	3.4
689	51	653	671	688	706	723	741	758	8	687	3	5.1
687	52	758	776	793	811	828	846	863	7	686	4	6.8
686	53	863	881	898	915	933	950	968	6	684	5	8.5
684	54	968	985	*002	*020	*037	*055	*072	5	683	6	10.2
683	55	9.08 072	089	107	124	141	159	176	4	681	7	11.9
681	56	176	193	211	228	245	262	280	3	680	8	13.6
680	57	280	297	314	331	349	366	383	2	678	9	15.3
678	58	383	400	418	435	452	469	486	1	677		
677	59	486	504	521	538	555	572	589	0	675		
		60″	50″	40″	30″	20″	10″	0″		9.99	P	P

IV

TABLE OF THE LOGARITHMS

OF THE

TRIGONOMETRIC FUNCTIONS

FROM MINUTE TO MINUTE

0° *90° 180° *270°

″	′	L Sin	d	C S	C T	L Tan	c d	L Cot	L Cos	
0	0	−∞		5.31 443	5.31 443	−∞		∞	0.00 000	60
60	1	6.46 373	30103	5.31 443	5.31 443	6.46 373	30103	3.53 627	0.00 000	59
120	2	6.76 476	17609	5.31 443	5.31 443	6.76 476	17609	3.23 524	0.00 000	58
180	3	6.94 085	12494	5.31 443	5.31 443	6.94 085	12494	3.05 915	0.00 000	57
240	4	7.06 579	9691	5.31 443	5.31 442	7.06 579	9691	2.93 421	0.00 000	56
300	5	7.16 270	7918	5.31 443	5.31 442	7.16 270	7918	2.83 730	0.00 000	55
360	6	7.24 188	6694	5.31 443	5.31 442	7.24 188	6694	2.75 812	0.00 000	54
420	7	7.30 882	5800	5.31 443	5.31 442	7.30 882	5800	2.69 118	0.00 000	53
480	8	7.36 682	5115	5.31 443	5.31 442	7.36 682	5115	2.63 318	0.00 000	52
540	9	7.41 797	4576	5.31 443	5.31 442	7.41 797	4576	2.58 203	0.00 000	51
600	10	7.46 373	4139	5.31 443	5.31 442	7.46 373	4139	2.53 627	0.00 000	50
660	11	7.50 512	3779	5.31 443	5.31 442	7.50 512	3779	2.49 488	0.00 000	49
720	12	7.54 291	3476	5.31 443	5.31 442	7.54 291	3476	2.45 709	0.00 000	48
780	13	7.57 767	3218	5.31 443	5.31 442	7.57 767	3219	2.42 233	0.00 000	47
840	14	7.60 985	2997	5.31 443	5.31 442	7.60 986	2996	2.39 014	0.00 000	46
900	15	7.63 982	2802	5.31 443	5.31 442	7.63 982	2803	2.36 018	0.00 000	45
960	16	7.66 784	2633	5.31 443	5.31 442	7.66 785	2633	2.33 215	0.00 000	44
1020	17	7.69 417	2483	5.31 443	5.31 442	7.69 418	2482	2.30 582	9.99 999	43
1080	18	7.71 900	2348	5.31 443	5.31 442	7.71 900	2348	2.28 100	9.99 999	42
1140	19	7.74 248	2227	5.31 443	5.31 442	7.74 248	2228	2.25 752	9.99 999	41
1200	20	7.76 475	2119	5.31 443	5.31 442	7.76 476	2119	2.23 524	9.99 999	40
1260	21	7.78 594	2021	5.31 443	5.31 442	7.78 595	2020	2.21 405	9.99 999	39
1320	22	7.80 615	1930	5.31 443	5.31 442	7.80 615	1931	2.19 385	9.99 999	38
1380	23	7.82 545	1848	5.31 443	5.31 442	7.82 546	1848	2.17 454	9.99 999	37
1440	24	7.84 393	1773	5.31 443	5.31 442	7.84 394	1773	2.15 606	9.99 999	36
1500	25	7.86 166	1704	5.31 443	5.31 442	7.86 167	1704	2.13 833	9.99 999	35
1560	26	7.87 870	1639	5.31 443	5.31 442	7.87 871	1639	2.12 129	9.99 999	34
1620	27	7.89 509	1579	5.31 443	5.31 442	7.89 510	1579	2.10 490	9.99 999	33
1680	28	7.91 088	1524	5.31 443	5.31 442	7.91 089	1524	2.08 911	9.99 999	32
1740	29	7.92 612	1472	5.31 443	5.31 441	7.92 613	1473	2.07 387	9.99 998	31
1800	30	7.94 084	1424	5.31 443	5.31 441	7.94 086	1424	2.05 914	9.99 998	30
1860	31	7.95 508	1379	5.31 443	5.31 441	7.95 510	1379	2.04 490	9.99 998	29
1920	32	7.96 887	1336	5.31 443	5.31 441	7.96 889	1336	2.03 111	9.99 998	28
1980	33	7.98 223	1297	5.31 443	5.31 441	7.98 225	1297	2.01 775	9.99 998	27
2040	34	7.99 520	1259	5.31 443	5.31 441	7.99 522	1259	2.00 478	9.99 998	26
2100	35	8.00 779	1223	5.31 443	5.31 441	8.00 781	1223	1.99 219	9.99 998	25
2160	36	8.02 002	1190	5.31 443	5.31 441	8.02 004	1190	1.97 996	9.99 998	24
2220	37	8.03 192	1158	5.31 443	5.31 441	8.03 194	1159	1.96 806	9.99 997	23
2280	38	8.04 350	1128	5.31 443	5.31 441	8.04 353	1128	1.95 647	9.99 997	22
2340	39	8.05 478	1100	5.31 443	5.31 441	8.05 481	1100	1.94 519	9.99 997	21
2400	40	8.06 578	1072	5.31 443	5.31 441	8.06 581	1072	1.93 419	9.99 997	20
2460	41	8.07 650	1046	5.31 444	5.31 440	8.07 653	1047	1.92 347	9.99 997	19
2520	42	8.08 696	1022	5.31 444	5.31 440	8.08 700	1022	1.91 300	9.99 997	18
2580	43	8.09 718	999	5.31 444	5.31 440	8.09 722	998	1.90 278	9.99 997	17
2640	44	8.10 717	976	5.31 444	5.31 440	8.10 720	976	1.89 280	9.99 996	16
2700	45	8.11 693	954	5.31 444	5.31 440	8.11 696	955	1.88 304	9.99 996	15
2760	46	8.12 647	934	5.31 444	5.31 440	8.12 651	934	1.87 349	9.99 996	14
2820	47	8.13 581	914	5.31 444	5.31 440	8.13 585	915	1 86 415	9.99 996	13
2880	48	8.14 495	896	5.31 444	5.31 440	8.14 500	895	1.85 500	9.99 996	12
2940	49	8.15 391	877	5.31 444	5.31 440	8.15 395	878	1.84 605	9.99 996	11
3000	50	8.16 268	860	5.31 444	5.31 439	8.16 273	860	1.83 727	9.99 995	10
3060	51	8.17 128	843	5.31 444	5.31 439	8.17 133	843	1.82 867	9.99 995	9
3120	52	8.17 971	827	5.31 444	5.31 439	8.17 976	828	1.82 024	9.99 995	8
3180	53	8.18 798	812	5.31 444	5.31 439	8.18 804	812	1.81 196	9.99 995	7
3240	54	8.19 610	797	5.31 444	5.31 439	8.19 616	797	1.80 384	9.99 995	6
3300	55	8.20 407	782	5.31 444	5.31 439	8.20 413	782	1.79 587	9.99 994	5
3360	56	8.21 189	769	5.31 444	5.31 439	8.21 195	769	1.78 805	9.99 994	4
3420	57	8.21 958	755	5.31 445	5.31 439	8.21 964	756	1.78 036	9.99 994	3
3480	58	8.22 713	743	5.31 445	5 31 438	8.22 720	742	1.77 280	9.99 994	2
3540	59	8.23 456	730	5.31 445	5.31 438	8.23 462	730	1.76 538	9.99 994	1
3600	60	8.24 186		5.31 445	5.31 438	8.24 192		1.75 808	9.99 993	0
		L Cos	d			L Cot	c d	L Tan	L Sin	′

*179 269 *359 89°

1°

*91° 181° *271°

″	′	L Sin	d	C S	C T	L Tan	c d	L Cot	L Cos	
3600	0	8.24 186		5.31 445	5.31 438	8.24 192		1.75 808	9.99 993	60
3660	1	8.24 903	717	5.31 445	5.31 438	8.24 910	718	1.75 090	9.99 993	59
3720	2	8.25 609	706	5.31 445	5.31 438	8.25 616	706	1.74 384	9.99 993	58
3780	3	8.26 304	695	5.31 445	5.31 438	8.26 312	696	1.73 688	9.99 993	57
3840	4	8.26 988	684	5.31 445	5.31 437	8.26 996	684	1.73 004	9.99 992	56
3900	5	8.27 661	673	5.31 445	5.31 437	8.27 669	673	1.72 331	9.99 992	55
3960	6	8.28 324	663	5.31 445	5.31 437	8.28 332	663	1.71 668	9.99 992	54
4020	7	8.28 977	653	5.31 445	5.31 437	8.28 986	654	1.71 014	9.99 992	53
4080	8	8.29 621	644	5.31 445	5.31 437	8.29 629	643	1.70 371	9.99 992	52
4140	9	8.30 255	634	5.31 445	5.31 437	8.30 263	634	1.69 737	9.99 991	51
4200	10	8.30 879	624	5.31 446	5.31 437	8.30 888	625	1.69 112	9.99 991	50
4260	11	8.31 495	616	5.31 446	5.31 436	8.31 505	617	1.68 495	9.99 991	49
4320	12	8.32 103	608	5.31 446	5.31 436	8.32 112	607	1.67 888	9.99 990	48
4380	13	8.32 702	599	5.31 446	5.31 436	8.32 711	599	1.67 289	9.99 990	47
4440	14	8.33 292	590	5.31 446	5.31 436	8.33 302	591	1.66 698	9.99 990	46
4500	15	8.33 875	583	5.31 446	5.31 436	8.33 886	584	1.66 114	9.99 990	45
4560	16	8.34 450	575	5.31 446	5.31 435	8.34 461	575	1.65 539	9.99 989	44
4620	17	8.35 018	568	5.31 446	5.31 435	8.35 029	568	1.64 971	9.99 989	43
4680	18	8.35 578	560	5.31 446	5.31 435	8.35 590	561	1.64 410	9.99 989	42
4740	19	8.36 131	553	5.31 446	5.31 435	8.36 143	553	1.63 857	9.99 989	41
4800	20	8.36 678	547	5.31 446	5.31 435	8.36 689	546	1.63 311	9.99 988	40
4860	21	8.37 217	539	5.31 447	5.31 434	8.37 229	540	1.62 771	9.99 988	39
4920	22	8.37 750	533	5.31 447	5.31 434	8.37 762	533	1.62 238	9.99 988	38
4980	23	8.38 276	526	5.31 447	5.31 434	8.38 289	527	1.61 711	9.99 987	37
5040	24	8.38 796	520	5.31 447	5.31 434	8.38 809	520	1.61 191	9.99 987	36
5100	25	8.39 310	514	5.31 447	5.31 434	8.39 323	514	1.60 677	9.99 987	35
5160	26	8.39 818	508	5.31 447	5.31 433	8.39 832	509	1.60 168	9.99 986	34
5220	27	8.40 320	502	5.31 447	5.31 433	8.40 334	502	1.59 666	9.99 986	33
5280	28	8.40 816	496	5.31 447	5.31 433	8.40 830	496	1.59 170	9.99 986	32
5340	29	8.41 307	491	5.31 447	5.31 433	8.41 321	491	1.58 679	9.99 985	31
5400	30	8.41 792	485	5.31 447	5.31 433	8.41 807	486	1.58 193	9.99 985	30
5460	31	8.42 272	480	5.31 448	5.31 432	8.42 287	480	1.57 713	9.99 985	29
5520	32	8.42 746	474	5.31 448	5.31 432	8.42 762	475	1.57 238	9.99 984	28
5580	33	8.43 216	470	5.31 448	5.31 432	8.43 232	470	1.56 768	9.99 984	27
5640	34	8.43 680	464	5.31 448	5.31 432	8.43 696	464	1.56 304	9.99 984	26
5700	35	8.44 139	459	5.31 448	5.31 431	8.44 156	460	1.55 844	9.99 983	25
5760	36	8.44 594	455	5.31 448	5.31 431	8.44 611	455	1.55 389	9.99 983	24
5820	37	8.45 044	450	5.31 448	5.31 431	8.45 061	450	1.54 939	9.99 983	23
5880	38	8.45 489	445	5.31 448	5.31 431	8.45 507	446	1.54 493	9.99 982	22
5940	39	8.45 930	441	5.31 449	5.31 431	8.45 948	441	1.54 052	9.99 982	21
6000	40	8.46 366	436	5.31 449	5.31 430	8.46 385	437	1.53 615	9.99 982	20
6060	41	8.46 799	433	5.31 449	5.31 430	8.46 817	432	1.53 183	9.99 981	19
6120	42	8.47 226	427	5.31 449	5.31 430	8.47 245	428	1.52 755	9.99 981	18
6180	43	8.47 650	424	5.31 449	5.31 430	8.47 669	424	1.52 331	9.99 981	17
6240	44	8.48 069	419	5.31 449	5.31 429	8.48 089	420	1.51 911	9.99 980	16
6300	45	8.48 485	416	5.31 449	5.31 429	8.48 505	416	1.51 495	9.99 980	15
6360	46	8.48 896	411	5.31 449	5.31 429	8.48 917	412	1.51 083	9.99 979	14
6420	47	8.49 304	408	5.31 450	5.31 428	8.49 325	408	1.50 675	9.99 979	13
6480	48	8.49 708	404	5.31 450	5.31 428	8.49 729	404	1.50 271	9.99 979	12
6540	49	8.50 108	400	5.31 450	5.31 428	8.50 130	401	1.49 870	9.99 978	11
6600	50	8.50 504	396	5.31 450	5.31 428	8.50 527	397	1.49 473	9.99 978	10
6660	51	8.50 897	393	5.31 450	5.31 427	8.50 920	393	1.49 080	9.99 977	9
6720	52	8.51 287	390	5.31 450	5.31 427	8.51 310	390	1.48 690	9.99 977	8
6780	53	8.51 673	386	5.31 450	5.31 427	8.51 696	386	1.48 304	9.99 977	7
6840	54	8.52 055	382	5.31 450	5.31 427	8.52 079	383	1.47 921	9.99 976	6
6900	55	8.52 434	379	5.31 451	5.31 426	8.52 459	380	1.47 541	9.99 976	5
6960	56	8.52 810	376	5.31 451	5.31 426	8.52 835	376	1.47 165	9.99 975	4
7020	57	8.53 183	373	5.31 451	5.31 426	8.53 208	373	1.46 792	9.99 975	3
7080	58	8.53 552	369	5.31 451	5.31 425	8.53 578	370	1.46 422	9.99 974	2
7140	59	8.53 919	367	5.31 451	5.31 425	8.53 945	367	1.46 055	9.99 974	1
7200	60	8.54 282	363	5.31 451	5.31 425	8.54 308	363	1.45 692	9.99 974	0
		L Cos	d			L Cot	c d	L Tan	L Sin	′

*178° 268° *358°

88°

2°

*92° 182° *272°

′	′	L Sin	d	C S	C T	L Tan	c d	L Cot	L Cos	′
7200	0	8.54 282	360	5.31 451	5.31 425	8.54 308	361	1.45 692	9.99 974	60
7260	1	8.54 642	357	5.31 451	5.31 425	8.54 669	358	1.45 331	9.99 973	59
7320	2	8.54 999	355	5.31 452	5.31 424	8.55 027	355	1.44 973	9.99 973	58
7380	3	8.55 354	351	5.31 452	5.31 424	8.55 382	352	1.44 618	9.99 972	57
7440	4	8.55 705	349	5.31 452	5.31 424	8.55 734	349	1.44 266	9.99 972	56
7500	5	8.56 054	346	5.31 452	5.31 423	8.56 083	346	1.43 917	9.99 971	55
7560	6	8.56 400	343	5.31 452	5.31 423	8.56 429	344	1.43 571	9.99 971	54
7620	7	8.56 743	341	5.31 452	5.31 423	8.56 773	341	1.43 227	9.99 970	53
7680	8	8.57 084	337	5.31 453	5.31 422	8.57 114	338	1.42 886	9.99 970	52
7740	9	8.57 421	336	5.31 453	5.31 422	8.57 452	336	1.42 548	9.99 969	51
7800	10	8.57 757	332	5.31 453	5.31 422	8.57 788	333	1.42 212	9.99 969	50
7860	11	8.58 089	330	5.31 453	5.31 421	8.58 121	330	1.41 879	9.99 968	49
7920	12	8.58 419	328	5.31 453	5.31 421	8.58 451	328	1.41 549	9.99 968	48
7980	13	8.58 747	325	5.31 453	5.31 421	8.58 779	326	1.41 221	9.99 967	47
8040	14	8.59 072	323	5.31 454	5.31 421	8.59 105	323	1.40 895	9.99 967	46
8100	15	8.59 395	320	5.31 454	5.31 420	8.59 428	321	1.40 572	9.99 967	45
8160	16	8.59 715	318	5.31 454	5.31 420	8.59 749	319	1.40 251	9.99 966	44
8220	17	8.60 033	316	5.31 454	5.31 420	8.60 068	316	1.39 932	9.99 966	43
8280	18	8.60 349	313	5.31 454	5.31 419	8.60 384	314	1.39 616	9.99 965	42
8340	19	8.60 662	311	5.31 454	5.31 419	8.60 698	311	1.39 302	9.99 964	41
8400	20	8.60 973	309	5.31 455	5.31 418	8.61 009	310	1.38 991	9.99 964	40
8460	21	8.61 282	307	5.31 455	5.31 418	8.61 319	307	1.38 681	9.99 963	39
8520	22	8.61 589	305	5.31 455	5.31 418	8.61 626	305	1.38 374	9.99 963	38
8580	23	8.61 894	302	5.31 455	5.31 417	8.61 931	303	1.38 069	9.99 962	37
8640	24	8.62 196	301	5.31 455	5.31 417	8.62 234	301	1.37 766	9.99 962	36
8700	25	8.62 497	298	5.31 455	5.31 417	8.62 535	299	1.37 465	9.99 961	35
8760	26	8.62 795	296	5.31 456	5.31 416	8.62 834	297	1.37 166	9.99 961	34
8820	27	8.63 091	294	5.31 456	5.31 416	8.63 131	295	1.36 869	9.99 960	33
8880	28	8.63 385	293	5.31 456	5.31 416	8.63 426	292	1.36 574	9.99 960	32
8940	29	8.63 678	290	5.31 456	5.31 415	8.63 718	291	1.36 282	9.99 959	31
9000	30	8.63 968	288	5.31 456	5.31 415	8.64 009	289	1.35 991	9.99 959	30
9060	31	8.64 256	287	5.31 456	5.31 415	8.64 298	287	1.35 702	9.99 958	29
9120	32	8.64 543	284	5.31 457	5.31 414	8.64 585	285	1.35 415	9.99 958	28
9180	33	8.64 827	283	5.31 457	5.31 414	8.64 870	284	1.35 130	9.99 957	27
9240	34	8.65 110	281	5.31 457	5.31 413	8.65 154	281	1.34 846	9.99 956	26
9300	35	8.65 391	279	5.31 457	5.31 413	8.65 435	280	1.34 565	9.99 956	25
9360	36	8.65 670	277	5.31 457	5.31 413	8.65 715	278	1.34 285	9.99 955	24
9420	37	8.65 947	276	5.31 458	5.31 412	8.65 993	276	1.34 007	9.99 955	23
9480	38	8.66 223	274	5.31 458	5.31 412	8.66 269	274	1.33 731	9.99 954	22
9540	39	8.66 497	272	5.31 458	5.31 412	8.66 543	273	1.33 457	9.99 954	21
9600	40	8.66 769	270	5.31 458	5.31 411	8.66 816	271	1.33 184	9.99 953	20
9660	41	8.67 039	269	5.31 458	5.31 411	8.67 087	269	1.32 913	9.99 952	19
9720	42	8.67 308	267	5.31 459	5.31 410	8.67 356	268	1.32 644	9.99 952	18
9780	43	8.67 575	266	5.31 459	5.31 410	8.67 624	266	1.32 376	9.99 951	17
9840	44	8.67 841	263	5.31 459	5.31 410	8.67 890	264	1.32 110	9.99 951	16
9900	45	8.68 104	263	5.31 459	5.31 409	8.68 154	263	1.31 846	9.99 950	15
9960	46	8.68 367	260	5.31 459	5.31 409	8.68 417	261	1.31 583	9.99 949	14
10020	47	8.68 627	259	5.31 460	5.31 408	8.68 678	260	1.31 322	9.99 949	13
10080	48	8.68 886	258	5.31 460	5.31 408	8.68 938	258	1.31 062	9.99 948	12
10140	49	8.69 144	256	5.31 460	5.31 408	8.69 196	257	1.30 804	9.99 948	11
10200	50	8.69 400	254	5.31 460	5.31 407	8.69 453	255	1.30 547	9.99 947	10
10260	51	8.69 654	253	5.31 460	5.31 407	8.69 708	254	1.30 292	9.99 946	9
10320	52	8.69 907	252	5.31 461	5.31 406	8.69 962	252	1.30 038	9.99 946	8
10380	53	8.70 159	250	5.31 461	5.31 406	8.70 214	251	1.29 786	9.99 945	7
10440	54	8.70 409	249	5.31 461	5.31 405	8.70 465	249	1.29 535	9.99 944	6
10500	55	8.70 658	247	5.31 461	5.31 405	8.70 714	248	1.29 286	9.99 944	5
10560	56	8.70 905	246	5.31 461	5.31 405	8.70 962	246	1.29 038	9.99 943	4
10620	57	8.71 151	244	5.31 462	5.31 404	8.71 208	245	1.28 792	9.99 942	3
10680	58	8.71 395	243	5.31 462	5.31 404	8.71 453	244	1.28 547	9.99 942	2
10740	59	8.71 638	242	5.31 462	5.31 403	8.71 697	243	1.28 303	9.99 941	1
10800	60	8.71 880		5.31 462	5.31 403	8.71 940		1.28 060	9.99 940	0
		L Cos	d			L Cot	c d	L Tan	L Sin	

*177° 267° *357°

3° *93° 183° *273°

′	L Sin	d	L Tan	c d	L Cot	L Cos	
0	8.71 880		8.71 940		1.28 060	9.99 940	60
		240		241			
1	8.72 120		8.72 181		1.27 819	9.99 940	59
		239		239			
2	8.72 359		8.72 420		1.27 580	9.99 939	58
		238		239			
3	8.72 597		8.72 659		1.27 341	9.99 938	57
		237		237			
4	8.72 834		8.72 896		1.27 104	9.99 938	56
		235		236			
5	8.73 069		8.73 132		1.26 868	9.99 937	55
		234		234			
6	8.73 303		8.73 366		1.26 634	9.99 936	54
		232		234			
7	8.73 535		8.73 600		1.26 400	9.99 936	53
		232		232			
8	8.73 767		8.73 832		1.26 168	9.99 935	52
		230		231			
9	8.73 997		8.74 063		1.25 937	9.99 934	51
		229		229			
10	8.74 226		8.74 292		1.25 708	9.99 934	50
		228		229			
11	8.74 454		8.74 521		1.25 479	9.99 933	49
		226		227			
12	8.74 680		8.74 748		1.25 252	9.99 932	48
		226		226			
13	8.74 906		8.74 974		1.25 026	9.99 932	47
		224		225			
14	8.75 130		8.75 199		1.24 801	9.99 931	46
		223		224			
15	8.75 353		8.75 423		1.24 577	9.99 930	45
		222		222			
16	8.75 575		8.75 645		1.24 355	9.99 929	44
		220		222			
17	8.75 795		8.75 867		1.24 133	9.99 929	43
		220		220			
18	8.76 015		8.76 087		1.23 913	9.99 928	42
		219		219			
19	8.76 234		8.76 306		1.23 694	9.99 927	41
		217		219			
20	8.76 451		8.76 525		1.23 475	9.99 926	40
		216		217			
21	8.76 667		8.76 742		1.23 258	9.99 926	39
		216		216			
22	8.76 883		8.76 958		1.23 042	9.99 925	38
		214		215			
23	8.77 097		8.77 173		1.22 827	9.99 924	37
		213		214			
24	8.77 310		8.77 387		1.22 613	9.99 923	36
		212		213			
25	8.77 522		8.77 600		1.22 400	9.99 923	35
		211		211			
26	8.77 733		8.77 811		1.22 189	9.99 922	34
		210		211			
27	8.77 943		8.78 022		1.21 978	9.99 921	33
		209		210			
28	8.78 152		8.78 232		1.21 768	9.99 920	32
		208		209			
29	8.78 360		8.78 441		1.21 559	9.99 920	31
		208		208			
30	8.78 568		8.78 649		1.21 351	9.99 919	30
		206		206			
31	8.78 774		8.78 855		1.21 145	9.99 918	29
		205		206			
32	8.78 979		8.79 061		1.20 939	9.99 917	28
		204		205			
33	8.79 183		8.79 266		1.20 734	9.99 917	27
		203		204			
34	8.79 386		8.79 470		1.20 530	9.99 916	26
		202		203			
35	8.79 588		8.79 673		1.20 327	9.99 915	25
		201		202			
36	8.79 789		8.79 875		1.20 125	9.99 914	24
		201		201			
37	8.79 990		8.80 076		1.19 924	9.99 913	23
		199		201			
38	8.80 189		8.80 277		1.19 723	9.99 913	22
		199		199			
39	8.80 388		8.80 476		1.19 524	9.99 912	21
		197		198			
40	8.80 585		8.80 674		1.19 326	9.99 911	20
		197		198			
41	8.80 782		8.80 872		1.19 128	9.99 910	19
		196		196			
42	8.80 978		8.81 068		1.18 932	9.99 909	18
		195		196			
43	8.81 173		8.81 264		1.18 736	9.99 909	17
		194		195			
44	8.81 367		8.81 459		1.18 541	9.99 908	16
		193		194			
45	8.81 560		8.81 653		1.18 347	9.99 907	15
		192		193			
46	8.81 752		8.81 846		1.18 154	9.99 906	14
		192		192			
47	8.81 944		8.82 038		1.17 962	9.99 905	13
		190		192			
48	8.82 134		8.82 230		1.17 770	9.99 904	12
		190		190			
49	8.82 324		8.82 420		1.17 580	9.99 904	11
		189		190			
50	8.82 513		8.82 610		1.17 390	9.99 903	10
		188		189			
51	8.82 701		8.82 799		1.17 201	9.99 902	9
		187		188			
52	8.82 888		8.82 987		1.17 013	9.99 901	8
		187		188			
53	8.83 075		8.83 175		1.16 825	9.99 900	7
		186		186			
54	8.83 261		8.83 361		1.16 639	9.99 899	6
		185		186			
55	8.83 446		8.83 547		1.16 453	9.99 898	5
		184		185			
56	8.83 630		8.83 732		1.16 268	9.99 898	4
		183		184			
57	8.83 813		8.83 916		1.16 084	9.99 897	3
		183		184			
58	8.83 996		8.84 100		1.15 900	9.99 896	2
		181		182			
59	8.84 177		8.84 282		1.15 718	9.99 895	1
		181		182			
60	8.84 358		8.84 464		1.15 536	9.99 894	0
	L Cos	d	L Cot	c d	L Tan	L Sin	

	P	P			
	241	239	237	235	234
1	4.0	4.0	4.0	3.9	3.9
2	8.0	8.0	7.9	7.8	7.8
3	12.0	12.0	11.8	11.8	11.7
4	16.1	15.9	15.8	15.7	15.6
5	20.1	19.9	19.8	19.6	19.5
6	24.1	23.9	23.7	23.5	23.4
7	28.1	27.9	27.6	27.4	27.3
8	32.1	31.9	31.6	31.3	31.2
9	36.2	35.8	35.6	35.2	35.1
10	40.2	39.8	39.5	39.2	39.0
20	80.3	79.7	79.0	78.3	78.0
30	120.5	119.5	118.5	117.5	117.0
40	160.7	159.3	158.0	156.7	156.0
50	200.8	199.2	197.5	195.8	195.0
	232	229	227	225	223
1	3.9	3.8	3.8	3.8	3.7
2	7.7	7.6	7.6	7.5	7.4
3	11.6	11.4	11.4	11.2	11.2
4	15.5	15.3	15.1	15.0	14.9
5	19.3	19.1	18.9	18.8	18.6
6	23.2	22.9	22.7	22.5	22.3
7	27.1	26.7	26.5	26.2	26.0
8	30.9	30.5	30.3	30.0	29.7
9	34.8	34.4	34.0	33.8	33.4
10	38.7	38.2	37.8	37.5	37.2
20	77.3	76.3	75.7	75.0	74.3
30	116.0	114.5	113.5	112.5	111.5
40	154.7	152.7	151.3	150.0	148.7
50	193.3	190.8	189.2	187.5	185.8
	222	220	217	215	213
1	3.7	3.7	3.6	3.6	3.6
2	7.4	7.3	7.2	7.2	7.1
3	11.1	11.0	10.8	10.8	10.6
4	14.8	14.7	14.5	14.3	14.2
5	18.5	18.3	18.1	17.9	17.8
6	22.2	22.0	21.7	21.5	21.3
7	25.9	25.7	25.3	25.1	24.8
8	29.6	29.3	28.9	28.7	28.4
9	33.3	33.0	32.6	32.2	32.0
10	37.0	36.7	36.2	35.8	35.5
20	74.0	73.3	72.3	71.7	71.0
30	111.0	110.0	108.5	107.5	106.5
40	148.0	146.7	144.7	143.3	142.0
50	185.0	183.3	180.8	179.2	177.5
	211	208	206	203	201
1	3.5	3.5	3.4	3.4	3.4
2	7.0	6.9	6.9	6.8	6.7
3	10.6	10.4	10.3	10.2	10.0
4	14.1	13.9	13.7	13.5	13.4
5	17.6	17.3	17.2	16.9	16.8
6	21.1	20.8	20.6	20.3	20.1
7	24.6	24.3	24.0	23.7	23.4
8	28.1	27.7	27.5	27.1	26.8
9	31.6	31.2	30.9	30.4	30.2
10	35.2	34.7	34.3	33.8	33.5
20	70.3	69.3	68.7	67.7	67.0
30	105.5	104.0	103.0	101.5	100.5
40	140.7	138.7	137.3	135.3	134.0
50	175.8	173.3	171.7	169.2	167.5
	199	197	195	193	192
1	3.3	3.3	3.2	3.2	3.2
2	6.6	6.6	6.5	6.4	6.4
3	10.0	9.8	9.8	9.6	9.6
4	13.3	13.1	13.0	12.9	12.8
5	16.6	16.4	16.2	16.1	16.0
6	19.9	19.7	19.5	19.3	19.2
7	23.2	23.0	22.8	22.5	22.4
8	26.5	26.3	26.0	25.7	25.6
9	29.8	29.6	29.2	29.0	28.8
10	33.2	32.8	32.5	32.2	32.0
20	66.3	65.7	65.0	64.3	64.0
30	99.5	98.5	97.5	96.5	96.0
40	132.7	131.3	130.0	128.7	128.0
50	165.8	164.2	162.5	160.8	160.0
	189	187	185	183	181
1	3.2	3.1	3.1	3.0	3.0
2	6.3	6.2	6.2	6.1	6.0
3	9.4	9.4	9.2	9.2	9.0
4	12.6	12.5	12.3	12.2	12.1
5	15.8	15.6	15.4	15.2	15.1
6	18.9	18.7	18.5	18.3	18.1
7	22.0	21.8	21.6	21.4	21.1
8	25.2	24.9	24.7	24.4	24.1
9	28.4	28.0	27.8	27.4	27.2
10	31.5	31.2	30.8	30.5	30.2
20	63.0	62.3	61.7	61.0	60.3
30	94.5	93.5	92.5	91.5	90.5
40	126.0	124.7	123.3	122.0	120.7
50	157.5	155.8	154.2	152.5	150.8
	P	P			

*176° 266° *356° 86°

4°

*94° 184° *274°

′	L Sin	d	L Tan	c d	L Cot	L Cos	
0	8.84 358		8.84 464		1.15 536	9.99 894	60
		181		182			
1	8.84 539		8.84 646		1.15 354	9.99 893	59
		179		180			
2	8.84 718		8.84 826		1.15 174	9.99 892	58
		179		180			
3	8.84 897		8.85 006		1.14 994	9.99 891	57
		178		179			
4	8.85 075		8.85 185		1.14 815	9.99 891	56
		177		178			
5	8.85 252		8.85 363		1.14 637	9.99 890	55
		177		177			
6	8.85 429		8.85 540		1.14 460	9.99 889	54
		176		177			
7	8.85 605		8.85 717		1.14 283	9.99 888	53
		175		176			
8	8.85 780		8.85 893		1.14 107	9.99 887	52
		175		176			
9	8.85 955		8.86 069		1.13 931	9.99 886	51
		173		174			
10	8.86 128		8.86 243		1.13 757	9.99 885	50
		173		174			
11	8.86 301		8.86 417		1.13 583	9.99 884	49
		173		174			
12	8.86 474		8.86 591		1.13 409	9.99 883	48
		171		172			
13	8.86 645		8.86 763		1.13 237	9.99 882	47
		171		172			
14	8.86 816		8.86 935		1.13 065	9.99 881	46
		171		171			
15	8.86 987		8.87 106		1.12 894	9.99 880	45
		169		171			
16	8.87 156		8.87 277		1.12 723	9.99 879	44
		169		170			
17	8.87 325		8.87 447		1.12 553	9.99 879	43
		169		169			
18	8.87 494		8.87 616		1.12 384	9.99 878	42
		167		169			
19	8.87 661		8.87 785		1.12 215	9.99 877	41
		168		168			
20	8.87 829		8.87 953		1.12 047	9.99 876	40
		166		167			
21	8.87 995		8.88 120		1.11 880	9.99 875	39
		166		167			
22	8.88 161		8.88 287		1.11 713	9.99 874	38
		165		166			
23	8.88 326		8.88 453		1.11 547	9.99 873	37
		164		165			
24	8.88 490		8.88 618		1.11 382	9.99 872	36
		164		165			
25	8.88 654		8.88 783		1.11 217	9.99 871	35
		163		165			
26	8.88 817		8.88 948		1.11 052	9.99 870	34
		163		163			
27	8.88 980		8.89 111		1.10 889	9.99 869	33
		162		163			
28	8.89 142		8.89 274		1.10 726	9.99 868	32
		162		163			
29	8.89 304		8.89 437		1.10 563	9.99 867	31
		160		161			
30	8.89 464		8.89 598		1.10 402	9.99 866	30
		161		162			
31	8.89 625		8.89 760		1.10 240	9.99 865	29
		159		160			
32	8.89 784		8.89 920		1.10 080	9.99 864	28
		159		160			
33	8.89 943		8.90 080		1.09 920	9.99 863	27
		159		160			
34	8.90 102		8.90 240		1.09 760	9.99 862	26
		158		159			
35	8.90 260		8.90 399		1.09 601	9.99 861	25
		157		158			
36	8.90 417		8.90 557		1.09 443	9.99 860	24
		157		158			
37	8.90 574		8.90 715		1.09 285	9.99 859	23
		156		157			
38	8.90 730		8.90 872		1.09 128	9.99 858	22
		155		157			
39	8.90 885		8.91 029		1.08 971	9.99 857	21
		155		156			
40	8.91 040		8.91 185		1.08 815	9.99 856	20
		155		155			
41	8.91 195		8.91 340		1.08 660	9.99 855	19
		154		155			
42	8.91 349		8.91 495		1.08 505	9.99 854	18
		153		155			
43	8.91 502		8.91 650		1.08 350	9.99 853	17
		153		153			
44	8.91 655		8.91 803		1.08 197	9.99 852	16
		152		154			
45	8.91 807		8.91 957		1.08 043	9.99 851	15
		152		153			
46	8.91 959		8.92 110		1.07 890	9.99 850	14
		151		152			
47	8.92 110		8.92 262		1.07 738	9.99 848	13
		151		152			
48	8.92 261		8.92 414		1.07 586	9.99 847	12
		150		151			
49	8.92 411		8.92 565		1.07 435	9.99 846	11
		150		151			
50	8.92 561		8.92 716		1.07 284	9.99 845	10
		149		150			
51	8.92 710		8.92 866		1.07 134	9.99 844	9
		149		150			
52	8.92 859		8.93 016		1.06 984	9.99 843	8
		148		149			
53	8.93 007		8.93 165		1.06 835	9.99 842	7
		147		148			
54	8.93 154		8.93 313		1.06 687	9.99 841	6
		147		149			
55	8.93 301		8.93 462		1.06 538	9.99 840	5
		147		147			
56	8.93 448		8.93 609		1.06 391	9.99 839	4
		146		147			
57	8.93 594		8.93 756		1.06 244	9.99 838	3
		146		147			
58	8.93 740		8.93 903		1.06 097	9.99 837	2
		145		146			
59	8.93 885		8.94 049		1.05 951	9.99 836	1
		145		146			
60	8.94 030		8.94 195		1.05 805	9.99 834	0
	L Cos	d	L Cot	c d	L Tan	L Sin	′

	P	P			
	182	181	179	178	177
1	3.0	3.0	3.0	3.0	3.0
2	6.1	6.0	6.0	5.9	5.9
3	9.1	9.0	9.0	8.9	8.8
4	12.1	12.1	11.9	11.9	11.8
5	15.2	15.1	14.9	14.8	14.8
6	18.2	18.1	17.9	17.8	17.7
7	21.2	21.1	20.9	20.8	20.6
8	24.3	24.1	23.9	23.7	23.6
9	27.3	27.2	26.8	26.7	26.6
10	30.3	30.2	29.8	29.7	29.5
20	60.7	60.3	59.7	59.3	59.0
30	91.0	90.5	89.5	89.0	88.5
40	121.3	120.7	119.3	118.7	118.0
50	151.7	150.8	149.2	148.3	147.5
	176	175	174	173	172
1	2.9	2.9	2.9	2.9	2.9
2	5.9	5.8	5.8	5.8	5.7
3	8.8	8.8	8.7	8.6	8.6
4	11.7	11.7	11.6	11.5	11.5
5	14.7	14.6	14.5	14.4	14.3
6	17.6	17.5	17.4	17.3	17.2
7	20.5	20.4	20.3	20.2	20.1
8	23.5	23.3	23.2	23.1	22.9
9	26.4	26.2	26.1	26.0	25.8
10	29.3	29.2	29.0	28.8	28.7
20	58.7	58.3	58.0	57.7	57.3
30	88.0	87.5	87.0	86.5	86.0
40	117.3	116.7	116.0	115.3	114.7
50	146.7	145.8	145.0	144.2	143.3
	171	170	169	168	167
1	2.8	2.8	2.8	2.8	2.8
2	5.7	5.7	5.6	5.6	5.6
3	8.6	8.5	8.4	8.4	8.4
4	11.4	11.3	11.3	11.2	11.1
5	14.2	14.2	14.1	14.0	13.9
6	17.1	17.0	16.9	16.8	16.7
7	20.0	19.8	19.7	19.6	19.5
8	22.8	22.7	22.5	22.4	22.3
9	25.6	25.5	25.4	25.2	25.0
10	28.5	28.3	28.2	28.0	27.8
20	57.0	56.7	56.3	56.0	55.7
30	85.5	85.0	84.5	84.0	83.5
40	114.0	113.3	112.7	112.0	111.3
50	142.5	141.7	140.8	140.0	139.2
	166	165	164	163	162
1	2.8	2.8	2.7	2.7	2.7
2	5.5	5.5	5.5	5.4	5.4
3	8.3	8.2	8.2	8.2	8.1
4	11.1	11.0	10.9	10.9	10.8
5	13.8	13.8	13.7	13.6	13.5
6	16.6	16.5	16.4	16.3	16.2
7	19.4	19.2	19.1	19.0	18.9
8	22.1	22.0	21.9	21.7	21.6
9	24.9	24.8	24.6	24.4	24.3
10	27.7	27.5	27.3	27.2	27.0
20	55.3	55.0	54.7	54.3	54.0
30	83.0	82.5	82.0	81.5	81.0
40	110.7	110.0	109.3	108.7	108.0
50	138.3	137.5	136.7	135.8	135.0
	161	160	159	158	157
1	2.7	2.7	2.6	2.6	2.6
2	5.4	5.3	5.3	5.3	5.2
3	8.0	8.0	8.0	7.9	7.8
4	10.7	10.7	10.6	10.5	10.5
5	13.4	13.3	13.2	13.2	13.1
6	16.1	16.0	15.9	15.8	15.7
7	18.8	18.7	18.6	18.4	18.3
8	21.5	21.3	21.2	21.1	20.9
9	24.2	24.0	23.8	23.7	23.6
10	26.9	26.7	26.5	26.3	26.2
20	53.7	53.3	53.0	52.7	52.3
30	80.5	80.0	79.5	79.0	78.5
40	107.3	106.7	106.0	105.3	104.7
50	134.2	133.3	132.5	131.7	130.8
	156	155	154	153	152
1	2.6	2.6	2.6	2.6	2.5
2	5.2	5.2	5.1	5.1	5.1
3	7.8	7.8	7.7	7.6	7.6
4	10.4	10.3	10.3	10.2	10.1
5	13.0	12.9	12.8	12.8	12.7
6	15.6	15.5	15.4	15.3	15.2
7	18.2	18.1	18.0	17.8	17.7
8	20.8	20.7	20.5	20.4	20.3
9	23.4	23.2	23.1	23.0	22.8
10	26.0	25.8	25.7	25.5	25.3
20	52.0	51.7	51.3	51.0	50.7
30	78.0	77.5	77.0	76.5	76.0
40	104.0	103.3	102.7	102.0	101.3
50	130.0	129.2	128.3	127.5	126.7

P P

*175° 265° *355°

85°

5°

*95° 185° *275°

′	L Sin	d	L Tan	c d	L Cot	L Cos	
0	8.94 030		8.94 195		1.05 805	9.99 834	60
		144		145			
1	8.94 174		8.94 340		1.05 660	9.99 833	59
		143		145			
2	8.94 317		8.94 485		1.05 515	9.99 832	58
		144		145			
3	8.94 461		8.94 630		1.05 370	9.99 831	57
		142		143			
4	8.94 603		8.94 773		1.05 227	9.99 830	56
		143		144			
5	8.94 746		8.94 917		1.05 083	9.99 829	55
		141		143			
6	8.94 887		8.95 060		1.04 940	9.99 828	54
		142		142			
7	8.95 029		8.95 202		1.04 798	9.99 827	53
		141		142			
8	8.95 170		8.95 344		1.04 656	9.99 825	52
		140		142			
9	8.95 310		8.95 486		1.04 514	9.99 824	51
		140		141			
10	8.95 450		8.95 627		1.04 373	9.99 823	50
		139		140			
11	8.95 589		8.95 767		1.04 233	9.99 822	49
		139		141			
12	8.95 728		8.95 908		1.04 092	9.99 821	48
		139		139			
13	8.95 867		8.96 047		1.03 952	9.99 820	47
		138		140			
14	8.96 005		8.96 187		1.03 813	9.99 819	46
		138		138			
15	8.96 143		8.96 325		1.03 675	9.99 817	45
		137		139			
16	8.96 280		8.96 464		1.03 536	9.99 816	44
		137		138			
17	8.96 417		8.96 602		1.03 398	9.99 815	43
		136		137			
18	8.96 553		8.96 739		1.03 261	9.99 814	42
		136		138			
19	8.96 689		8.96 877		1.03 123	9.99 813	41
		136		136			
20	8.96 825		8.97 013		1.02 987	9.99 812	40
		135		137			
21	8.96 960		8.97 150		1.02 850	9.99 810	39
		135		135			
22	8.97 095		8.97 285		1.02 715	9.99 809	38
		134		136			
23	8.97 229		8.97 421		1.02 579	9.99 808	37
		134		135			
24	8.97 363		8.97 556		1.02 444	9.99 807	36
		133		135			
25	8.97 496		8.97 691		1.02 309	9.99 806	35
		133		134			
26	8.97 629		8.97 825		1.02 175	9.99 804	34
		133		134			
27	8.97 762		8.97 959		1.02 041	9.99 803	33
		132		133			
28	8.97 894		8.98 092		1.01 908	9.99 802	32
		132		133			
29	8.98 026		8.98 225		1.01 775	9.99 801	31
		131		133			
30	8.98 157		8.98 358		1.01 642	9.99 800	30
		131		132			
31	8.98 288		8.98 490		1.01 510	9.99 798	29
		131		132			
32	8.98 419		8.98 622		1.01 378	9.99 797	28
		130		131			
33	8.98 549		8.98 753		1.01 247	9.99 796	27
		130		131			
34	8.98 679		8.98 884		1.01 116	9.99 795	26
		129		131			
35	8.98 808		8.99 015		1.00 985	9.99 793	25
		129		130			
36	8.98 937		8.99 145		1.00 855	9.99 792	24
		129		130			
37	8.99 066		8.99 275		1.00 725	9.99 791	23
		128		130			
38	8.99 194		8.99 405		1.00 595	9.99 790	22
		128		129			
39	8.99 322		8.99 534		1.00 466	9.99 788	21
		128		128			
40	8.99 450		8.99 662		1.00 338	9.99 787	20
		127		129			
41	8.99 577		8.99 791		1.00 209	9.99 786	19
		127		128			
42	8.99 704		8.99 919		1.00 081	9.99 785	18
		126		127			
43	8.99 830		9.00 046		0.99 954	9.99 783	17
		126		128			
44	8.99 956		9.00 174		0.99 826	9.99 782	16
		126		127			
45	9.00 082		9.00 301		0.99 699	9.99 781	15
		125		126			
46	9.00 207		9.00 427		0.99 573	9.99 780	14
		125		126			
47	9.00 332		9.00 553		0.99 447	9.99 778	13
		124		126			
48	9.00 456		9.00 679		0.99 321	9.99 777	12
		125		126			
49	9.00 581		9.00 805		0.99 195	9.99 776	11
		123		125			
50	9.00 704		9.00 930		0.99 070	9.99 775	10
		124		125			
51	9.00 828		9.01 055		0.98 945	9.99 773	9
		123		124			
52	9.00 951		9.01 179		0.98 821	9.99 772	8
		123		124			
53	9.01 074		9.01 303		0.98 697	9.99 771	7
		122		124			
54	9.01 196		9.01 427		0.98 573	9.99 769	6
		122		123			
55	9.01 318		9.01 550		0.98 450	9.99 768	5
		122		123			
56	9.01 440		9.01 673		0.98 327	9.99 767	4
		121		123			
57	9.01 561		9.01 796		0.98 204	9.99 765	3
		121		122			
58	9.01 682		9.01 918		0.98 082	9.99 764	2
		121		122			
59	9.01 803		9.02 040		0.97 960	9.99 763	1
		120		122			
60	9.01 923		9.02 162		0.97 838	9.99 761	0
′	L Cos	d	L Cot	c d	L Tan	L Sin	′

P	P			
151	149	148	147	146
1 2.5	2.5	2.5	2.4	2.4
2 5.0	5.0	4.9	4.9	4.9
3 7.6	7.4	7.4	7.4	7.3
4 10.1	9.9	9.9	9.8	9.7
5 12.6	12.4	12.3	12.2	12.2
6 15.1	14.9	14.8	14.7	14.6
7 17.6	17.4	17.3	17.2	17.0
8 20.1	19.9	19.7	19.6	19.5
9 22.6	22.4	22.2	22.0	21.9
10 25.2	24.8	24.7	24.5	24.3
20 50.3	49.7	49.3	49.0	48.7
30 75.5	74.5	74.0	73.5	73.0
40 100.7	99.3	98.7	98.0	97.3
50 125.8	124.2	123.3	122.5	121.7
145	144	143	142	141
1 2.4	2.4	2.4	2.4	2.4
2 4.8	4.8	4.8	4.7	4.7
3 7.2	7.2	7.2	7.1	7.0
4 9.7	9.6	9.5	9.5	9.4
5 12.1	12.0	11.9	11.8	11.8
6 14.5	14.4	14.3	14.2	14.1
7 16.9	16.8	16.7	16.6	16.4
8 19.3	19.2	19.1	18.9	18.8
9 21.8	21.6	21.4	21.3	21.2
10 24.2	24.0	23.8	23.7	23.5
20 48.3	48.0	47.7	47.3	47.0
30 72.5	72.0	71.5	71.0	70.5
40 96.7	96.0	95.3	94.7	94.0
50 120.8	120.0	119.2	118.3	117.5
140	139	138	137	136
1 2.3	2.3	2.3	2.3	2.3
2 4.7	4.6	4.6	4.6	4.5
3 7.0	7.0	6.9	6.8	6.8
4 9.3	9.3	9.2	9.1	9.1
5 11.7	11.6	11.5	11.4	11.3
6 14.0	13.9	13.8	13.7	13.6
7 16.3	16.2	16.1	16.0	15.9
8 18.7	18.5	18.4	18.3	18.1
9 21.0	20.8	20.7	20.6	20.4
10 23.3	23.2	23.0	22.8	22.7
20 46.7	46.3	46.0	45.7	45.3
30 70.0	69.5	69.0	68.5	68.0
40 93.3	92.7	92.0	91.3	90.7
50 116.7	115.8	115.0	114.2	113.3
135	134	133	132	131
1 2.2	2.2	2.2	2.2	2.2
2 4.5	4.5	4.4	4.4	4.4
3 6.8	6.7	6.6	6.6	6.6
4 9.0	8.9	8.9	8.8	8.7
5 11.2	11.2	11.1	11.0	10.9
6 13.5	13.4	13.3	13.2	13.1
7 15.8	15.6	15.5	15.4	15.3
8 18.0	17.9	17.7	17.6	17.5
9 20.2	20.1	20.0	19.8	19.6
10 22.5	22.3	22.2	22.0	21.8
20 45.0	44.7	44.3	44.0	43.7
30 67.5	67.0	66.5	66.0	65.5
40 90.0	89.3	88.7	88.0	87.3
50 112.5	111.7	110.8	110.0	109.2
130	129	128	127	126
1 2.2	2.2	2.1	2.1	2.1
2 4.3	4.3	4.3	4.2	4.2
3 6.5	6.4	6.4	6.4	6.3
4 8.7	8.6	8.5	8.5	8.4
5 10.8	10.8	10.7	10.6	10.5
6 13.0	12.9	12.8	12.7	12.6
7 15.2	15.0	14.9	14.8	14.7
8 17.3	17.2	17.1	16.9	16.8
9 19.5	19.4	19.2	19.0	18.9
10 21.7	21.5	21.3	21.1	21.0
20 43.3	43.0	42.7	42.3	42.0
30 65.0	64.5	64.0	63.5	63.0
40 86.7	86.0	85.3	84.7	84.0
50 108.3	107.5	106.7	105.8	105.0
125	124	123	122	121
1 2.1	2.1	2.0	2.0	2.0
2 4.2	4.1	4.1	4.1	4.0
3 6.2	6.2	6.2	6.1	6.0
4 8.3	8.3	8.2	8.1	8.1
5 10.4	10.3	10.2	10.2	10.1
6 12.5	12.4	12.3	12.2	12.1
7 14.6	14.5	14.4	14.2	14.1
8 16.7	16.5	16.4	16.3	16.1
9 18.8	18.6	18.4	18.3	18.2
10 20.8	20.7	20.5	20.3	20.2
20 41.7	41.3	41.0	40.7	40.3
30 62.5	62.0	61.5	61.0	60.5
40 83.3	82.7	82.0	81.3	80.7
50 104.2	103.3	102.5	101.7	100.8

P	P

*174° 264° *354° 84°

	L Sin	d	L Tan	c d	L Cot	L Cos		P P
0	9.01 923		9.02 162		0.97 838	9.99 761	60	
		120		121				121 120 119 118
1	9.02 043	120	9.02 283	121	0.97 717	9.99 760	59	1 2.0 2.0 2.0 2.0
2	9.02 163	120	9.02 404	121	0.97 596	9.99 759	58	2 4.0 4.0 4.0 3.9
3	9.02 283	119	9.02 525	120	0.97 475	9.99 757	57	3 6.0 6.0 6.0 5.9
4	9.02 402	118	9.02 645	121	0.97 355	9.99 756	56	4 8.1 8.0 7.9 7.9
5	9.02 520	119	9.02 766	119	0.97 234	9.99 755	55	5 10.1 10.0 9.9 9.8
6	9.02 639	118	9.02 885	120	0.97 115	9.99 753	54	6 12.1 12.0 11.9 11.8
7	9.02 757	117	9.03 005	119	0.96 995	9.99 752	53	7 14.1 14.0 13.9 13.8
8	9.02 874	118	9.03 124	118	0.96 876	9.99 751	52	8 16.1 16.0 15.9 15.7
9	9.02 992	117	9.03 242	119	0.96 758	9.99 749	51	9 18.2 18.0 17.8 17.7
10	9.03 109	117	9.03 361	118	0.96 639	9.99 748	50	10 20.2 20.0 19.8 19.7
11	9.03 226	116	9.03 479	118	0.96 521	9.99 747	49	20 40.3 40.0 39.7 39.3
12	9.03 342	116	9.03 597	118	0.96 403	9.99 745	48	30 60.5 60.0 59.5 59.0
13	9.03 458	116	9.03 714	117	0.96 286	9.99 744	47	40 80.7 80.0 79.3 78.7
14	9.03 574	116	9.03 832	118	0.96 168	9.99 742	46	50 100.8 100.0 99.2 98.3
15	9.03 690	115	9.03 948	116	0.96 052	9.99 741	45	
16	9.03 805	115	9.04 065	117	0.95 935	9.99 740	44	
				116				117 116 115 114
17	9.03 920	114	9.04 181	116	0.95 819	9.99 738	43	1 2.0 1.9 1.9 1.9
18	9.04 034	115	9.04 297	116	0.95 703	9.99 737	42	2 3.9 3.9 3.8 3.8
19	9.04 149	113	9.04 413	115	0.95 587	9.99 736	41	3 5.8 5.8 5.8 5.7
20	9.04 262	114	9.04 528	115	0.95 472	9.99 734	40	4 7.8 7.7 7.7 7.6
21	9.04 376	114	9.04 643	115	0.95 357	9.99 733	39	5 9.8 9.7 9.6 9.5
22	9.04 490	113	9.04 758	115	0.95 242	9.99 731	38	6 11.7 11.6 11.5 11.4
23	9.04 603	112	9.04 873	114	0.95 127	9.99 730	37	7 13.6 13.5 13.4 13.3
24	9.04 715	113	9.04 987	114	0.95 013	9.99 728	36	8 15.6 15.5 15.3 15.2
25	9.04 828	112	9.05 101	113	0.94 899	9.99 727	35	9 17.6 17.4 17.2 17.1
26	9.04 940	112	9.05 214	114	0.94 786	9.99 726	34	10 19.5 19.3 19.2 19.0
27	9.05 052	112	9.05 328	113	0.94 672	9.99 724	33	20 39.0 38.7 38.3 38.0
28	9.05 164	111	9.05 441	112	0.94 559	9.99 723	32	30 58.5 58.0 57.5 57.0
29	9.05 275	111	9.05 553	113	0.94 447	9.99 721	31	40 78.0 77.3 76.7 76.0
30	9.05 386	111	9.05 666	112	0.94 334	9.99 720	30	50 97.5 96.7 95.8 95.0
								113 112 111 110
31	9.05 497	110	9.05 778	112	0.94 222	9.99 718	29	1 1.9 1.9 1.8 1.8
32	9.05 607	110	9.05 890	112	0.94 110	9.99 717	28	2 3.8 3.7 3.7 3.7
33	9.05 717	110	9.06 002	111	0.93 998	9.99 716	27	3 5.6 5.6 5.6 5.5
34	9.05 827	110	9.06 113	111	0.93 887	9.99 714	26	4 7.5 7.5 7.4 7.3
35	9.05 937	109	9.06 224	111	0.93 776	9.99 713	25	5 9.4 9.3 9.2 9.2
36	9.06 046	109	9.06 335	110	0.93 665	9.99 711	24	6 11.3 11.2 11.1 11.0
37	9.06 155	109	9.06 445	111	0.93 555	9.99 710	23	7 13.2 13.1 13.0 12.8
38	9.06 264	108	9.06 556	110	0.93 444	9.99 708	22	8 15.1 14.9 14.8 14.7
39	9.06 372	109	9.06 666	109	0.93 334	9.99 707	21	9 17.0 16.8 16.6 16.5
40	9.06 481	108	9.06 775	110	0.93 225	9.99 705	20	10 18.8 18.7 18.5 18.3
41	9.06 589	107	9.06 885	109	0.93 115	9.99 704	19	20 37.7 37.3 37.0 36.7
42	9.06 696	108	9.06 994	109	0.93 006	9.99 702	18	30 56.5 56.0 55.5 55.0
43	9.06 804	107	9.07 103	108	0.92 897	9.99 701	17	40 75.3 74.7 74.0 73.3
44	9.06 911	107	9.07 211	109	0.92 789	9.99 699	16	50 94.2 93.3 92.5 91.7
45	9.07 018	106	9.07 320	108	0.92 680	9.99 698	15	
46	9.07 124	107	9.07 428	108	0.92 572	9.99 696	14	
47	9.07 231	106	9.07 536	107	0.92 464	9.99 695	13	109 108 107 106
48	9.07 337	105	9.07 643	108	0.92 357	9.99 693	12	1 1.8 1.8 1.8 1.8
49	9.07 442	106	9.07 751	107	0.92 249	9.99 692	11	2 3.6 3.6 3.6 3.5
50	9.07 548	105	9.07 858	106	0.92 142	9.99 690	10	3 5.4 5.4 5.4 5.3
51	9.07 653	105	9.07 964	107	0.92 036	9.99 689	9	4 7.3 7.2 7.1 7.1
52	9.07 758	105	9.08 071	106	0.91 929	9.99 687	8	5 9.1 9.0 8.9 8.8
53	9.07 863	105	9.08 177	106	0.91 823	9.99 686	7	6 10.9 10.8 10.7 10.6
54	9.07 968	104	9.08 283	106	0.91 717	9.99 684	6	7 12.7 12.6 12.5 12.4
55	9.08 072	104	9.08 389	106	0.91 611	9.99 683	5	8 14.5 14.4 14.3 14.1
56	9.08 176	104	9.08 495	105	0.91 505	9.99 681	4	9 16.4 16.2 16.0 15.9
57	9.08 280	103	9.08 600	105	0.91 400	9.99 680	3	10 18.2 18.0 17.8 17.7
58	9.08 383	103	9.08 705	105	0.91 295	9.99 678	2	20 36.3 36.0 35.7 35.3
59	9.08 486	103	9.08 810	104	0.91 190	9.99 677	1	30 54.5 54.0 53.5 53.0
60	9.08 589		9.08 914		0.91 086	9.99 675	0	40 72.7 72.0 71.3 70.7
								50 90.8 90.0 89.2 88.3
	L Cos	d	L Cot	c d	L Tan	L Sin	′	P P

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′	L Sin	d	L Tan	c d	L Cot	L Cos		P P
0	9.08 589	103	9.08 914	105	0.91 086	9.99 675	60	
1	9.08 692	103	9.09 019	104	0.90 981	9.99 674	59	
2	9.08 795	102	9.09 123	104	0.90 877	9.99 672	58	
3	9.08 897	102	9.09 227	103	0.90 773	9.99 670	57	
4	9.08 999	102	9.09 330	104	0.90 670	9.99 669	56	
5	9.09 101	101	9.09 434	103	0.90 566	9.99 667	55	
6	9.09 202	102	9.09 537	103	0.90 463	9.99 666	54	
7	9.09 304	101	9.09 640	102	0.90 360	9.99 664	53	
8	9.09 405	101	9.09 742	103	0.90 258	9.99 663	52	
9	9.09 506	100	9.09 845	102	0.90 155	9.99 661	51	
10	9.09 606	101	9.09 947	102	0.90 053	9.99 659	50	
11	9.09 707	100	9.10 049	101	0.89 951	9.99 658	49	
12	9.09 807	100	9.10 150	102	0.89 850	9.99 656	48	
13	9.09 907	99	9.10 252	101	0.89 748	9.99 655	47	
14	9.10 006	100	9.10 353	101	0.89 647	9.99 653	46	
15	9.10 106	99	9.10 454	101	0.89 546	9.99 651	45	
16	9.10 205	99	9.10 555	101	0.89 445	9.99 650	44	
17	9.10 304	98	9.10 656	100	0.89 344	9.99 648	43	
18	9.10 402	99	9.10 756	100	0.89 244	9.99 647	42	
19	9.10 501	98	9.10 856	100	0.89 144	9.99 645	41	
20	9.10 599	98	9.10 956	100	0.89 044	9.99 643	40	
21	9.10 697	98	9.11 056	99	0.88 944	9.99 642	39	
22	9.10 795	98	9.11 155	99	0.88 845	9.99 640	38	
23	9.10 893	97	9.11 254	99	0.88 746	9.99 638	37	
24	9.10 990	97	9.11 353	99	0.88 647	9.99 637	36	
25	9.11 087	97	9.11 452	99	0.88 548	9.99 635	35	
26	9.11 184	97	9.11 551	98	0.88 449	9.99 633	34	
27	9.11 281	96	9.11 649	98	0.88 351	9.99 632	33	
28	9.11 377	97	9.11 747	98	0.88 253	9.99 630	32	
29	9.11 474	96	9.11 845	98	0.88 155	9.99 629	31	
30	9.11 570	96	9.11 943	97	0.88 057	9.99 627	30	
31	9.11 666	95	9.12 040	98	0.87 960	9.99 625	29	
32	9.11 761	96	9.12 138	97	0.87 862	9.99 624	28	
33	9.11 857	95	9.12 235	97	0.87 765	9.99 622	27	
34	9.11 952	95	9.12 332	96	0.87 668	9.99 620	26	
35	9.12 047	95	9.12 428	97	0.87 572	9.99 618	25	
36	9.12 142	94	9.12 525	96	0.87 475	9.99 617	24	
37	9.12 236	95	9.12 621	96	0.87 379	9.99 615	23	
38	9.12 331	94	9.12 717	96	0.87 283	9.99 613	22	
39	9.12 425	94	9.12 813	96	0.87 187	9.99 612	21	
40	9.12 519	93	9.12 909	95	0.87 091	9.99 610	20	
41	9.12 612	94	9.13 004	95	0.86 996	9.99 608	19	
42	9.12 706	93	9.13 099	95	0.86 901	9.99 607	18	
43	9.12 799	93	9.13 194	95	0.86 806	9.99 605	17	
44	9.12 892	93	9.13 289	95	0.86 711	9.99 603	16	
45	9.12 985	93	9.13 384	94	0.86 616	9.99 601	15	
46	9.13 078	93	9.13 478	95	0.86 522	9.99 600	14	
47	9.13 171	92	9.13 573	94	0.86 427	9.99 598	13	
48	9.13 263	92	9.13 667	94	0.86 333	9.99 596	12	
49	9.13 355	92	9.13 761	93	0.86 239	9.99 595	11	
50	9.13 447	92	9.13 854	94	0.86 146	9.99 593	10	
51	9.13 539	91	9.13 948	93	0.86 052	9.99 591	9	
52	9.13 630	92	9.14 041	93	0.85 959	9.99 589	8	
53	9.13 722	91	9.14 134	93	0.85 866	9.99 588	7	
54	9.13 813	91	9.14 227	93	0.85 773	9.99 586	6	
55	9.13 904	90	9.14 320	92	0.85 680	9.99 584	5	
56	9.13 994	91	9.14 412	92	0.85 588	9.99 582	4	
57	9.14 085	90	9.14 504	93	0.85 496	9.99 581	3	
58	9.14 175	91	9.14 597	91	0.85 403	9.99 579	2	
59	9.14 266	90	9.14 688	92	0.85 312	9.99 577	1	
60	9.14 356		9.14 780		0.85 220	9.99 575	0	
	L Cos	d	L Cot	c d	L Tan	L Sin	′	P P

	105	104	103	102
1	1.8	1.7	1.7	1.7
2	3.5	3.5	3.4	3.4
3	5.2	5.2	5.2	5.1
4	7.0	6.9	6.9	6.8
5	8.8	8.7	8.6	8.5
6	10.5	10.4	10.3	10.2
7	12.2	12.1	12.0	11.9
8	14.0	13.9	13.7	13.6
9	15.8	15.6	15.4	15.3
10	17.5	17.3	17.2	17.0
20	35.0	34.7	34.3	34.0
30	52.5	52.0	51.5	51.0
40	70.0	69.3	68.7	68.0
50	87.5	86.7	85.8	85.0

	101	100	99	98
1	1.7	1.7	1.6	1.6
2	3.4	3.3	3.3	3.3
3	5.0	5.0	5.0	4.9
4	6.7	6.7	6.6	6.5
5	8.4	8.3	8.2	8.2
6	10.1	10.0	9.9	9.8
7	11.8	11.7	11.6	11.4
8	13.5	13.3	13.2	13.1
9	15.2	15.0	14.8	14.7
10	16.8	16.7	16.5	16.3
20	33.7	33.3	33.0	32.7
30	50.5	50.0	49.5	49.0
40	67.3	66.7	66.0	65.3
50	84.2	83.3	82.5	81.7

	97	96	95	94
1	1.6	1.6	1.6	1.6
2	3.2	3.2	3.2	3.1
3	4.8	4.8	4.8	4.7
4	6.5	6.4	6.3	6.3
5	8.1	8.0	7.9	7.8
6	9.7	9.6	9 5	9.4
7	11.3	11.2	11.1	11.0
8	12.9	12.8	12.7	12.5
9	14.6	14.4	14.2	14.1
10	16.2	16.0	15.8	15.7
20	32.3	32.0	31.7	31.3
30	48.5	48.0	47.5	47.0
40	64.7	64.0	63.3	62.7
50	80.8	80.0	79.2	78.3

	93	92	91	90
1	1.6	1.5	1.5	1.5
2	3.1	3.1	3.0	3.0
3	4.6	4.6	4.6	4.5
4	6.2	6.1	6.1	6.0
5	7.8	7.7	7.6	7.5
6	9.3	9.2	9.1	9.0
7	10.8	10.7	10.6	10.5
8	12.4	12.3	12.1	12.0
9	14.0	13.8	13.6	13.5
10	15.5	15.3	15.2	15.0
20	31.0	30.7	30.3	30.0
30	46.5	46.0	45.5	45.0
40	62.0	61.3	60.7	60.0
50	77.5	76.7	75.8	75.0

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	L Sin	d	L Tan	c d	L Cot	L Cos		P	P	
									92	91	90
0	9.14 356	89	9.14 780	92	0.85 220	9.99 575	60	1	1.5	1.5	1.5
1	9.14 445	90	9.14 872	91	0.85 128	9.99 574	59	2	3.1	3.0	3.0
2	9.14 535	89	9.14 963	91	0.85 037	9.99 572	58	3	4.6	4.6	4.5
3	9.14 624	90	9.15 054	91	0.84 946	9.99 570	57	4	6.1	6.1	6.0
4	9.14 714	89	9.15 145	91	0.84 855	9.99 568	56	5	7.7	7.6	7.5
5	9.14 803	88	9.15 236	91	0.84 764	9.99 566	55	6	9.2	9.1	9.0
6	9.14 891	89	9.15 327	90	0.84 673	9.99 565	54	7	10.7	10.6	10.5
7	9.14 980	89	9.15 417	91	0.84 583	9.99 563	53	8	12.3	12.1	12.0
8	9.15 069	88	9.15 508	90	0.84 492	9.99 561	52	9	13.8	13.6	13.5
9	9.15 157	88	9.15 598	90	0.84 402	9.99 559	51	10	15.3	15.2	15.0
10	9.15 245	88	9.15 688	89	0.84 312	9.99 557	50	20	30.7	30.3	30.0
11	9.15 333	88	9.15 777	90	0.84 223	9.99 556	49	30	46.0	45.5	45.0
12	9.15 421	87	9.15 867	89	0.84 133	9.99 554	48	40	61.3	60.7	60.0
13	9.15 508	88	9.15 956	90	0.84 044	9.99 552	47	50	76.7	75.8	75.0
14	9.15 596	87	9.16 046	89	0.83 954	9.99 550	46				
15	9.15 683	87	9.16 135	89	0.83 865	9.99 548	45		89	88	87
16	9.15 770	87	9.16 224	88	0.83 776	9.99 546	44	1	1.5	1.5	1.4
17	9.15 857	87	9.16 312	89	0.83 688	9.99 545	43	2	3.0	2.9	2.9
18	9.15 944	86	9.16 401	88	0.83 599	9.99 543	42	3	4.4	4.4	4.4
19	9.16 030	86	9.16 489	88	0.83 511	9.99 541	41	4	5.9	5.9	5.8
20	9.16 116	87	9.16 577	88	0.83 423	9.99 539	40	5	7.4	7.3	7.2
21	9.16 203	86	9.16 665	88	0.83 335	9.99 537	39	6	8.9	8.8	8.7
22	9.16 289	85	9.16 753	88	0.83 247	9.99 535	38	7	10.4	10.3	10.2
23	9.16 374	86	9.16 841	87	0.83 159	9.99 533	37	8	11.9	11.7	11.6
24	9.16 460	85	9.16 928	88	0.83 072	9.99 532	36	9	13.4	13.2	13.0
25	9.16 545	86	9.17 016	87	0.82 984	9.99 530	35	10	14.8	14.7	14.5
26	9.16 631	85	9.17 103	87	0.82 897	9.99 528	34	20	29.7	29.3	29.0
27	9.16 716	85	9.17 190	87	0.82 810	9.99 526	33	30	44.5	44.0	43.5
28	9.16 801	85	9.17 277	86	0.82 723	9.99 524	32	40	59.3	58.7	58.0
29	9.16 886	84	9.17 363	87	0.82 637	9.99 522	31	50	74.2	73.3	72.5
30	9.16 970	85	9.17 450	86	0.82 550	9.99 520	30				
31	9.17 055	84	9.17 536	86	0.82 464	9.99 518	29		86	85	84
32	9.17 139	84	9.17 622	86	0.82 378	9.99 517	28	1	1.4	1.4	1.4
33	9.17 223	84	9.17 708	86	0.82 292	9.99 515	27	2	2.9	2.8	2.8
34	9.17 307	84	9.17 794	86	0.82 206	9.99 513	26	3	4.3	4.2	4.2
35	9.17 391	83	9.17 880	85	0.82 120	9.99 511	25	4	5.7	5.7	5.6
36	9.17 474	84	9.17 965	86	0.82 035	9.99 509	24	5	7.2	7.1	7.0
37	9.17 558	83	9.18 051	85	0.81 949	9.99 507	23	6	8.6	8.5	8.4
38	9.17 641	83	9.18 136	85	0.81 864	9.99 505	22	7	10.0	9.9	9.8
39	9.17 724	83	9.18 221	85	0.81 779	9.99 503	21	8	11.5	11.3	11.2
40	9.17 807	83	9.18 306	85	0.81 694	9.99 501	20	9	12.9	12.8	12.6
41	9.17 890	83	9.18 391	84	0.81 609	9.99 499	19	10	14.3	14.2	14.0
42	9.17 973	82	9.18 475	85	0.81 525	9.99 497	18	20	28.7	28.3	28.0
43	9.18 055	82	9.18 560	84	0.81 440	9.99 495	17	30	43.0	42.5	42.0
44	9.18 137	83	9.18 644	84	0.81 356	9.99 494	16	40	57.3	56.7	56.0
45	9.18 220	82	9.18 728	84	0.81 272	9.99 492	15	50	71.7	70.8	70.0
46	9.18 302	81	9.18 812	84	0.81 188	9.99 490	14				
47	9.18 383	82	9.18 896	83	0.81 104	9.99 488	13		83	82	81
48	9.18 465	82	9.18 979	84	0.81 021	9.99 486	12	1	1.4	1.4	1.4
49	9.18 547	81	9.19 063	83	0.80 937	9.99 484	11	2	2.8	2.7	2.7
50	9.18 628	81	9.19 146	83	0.80 854	9.99 482	10	3	4.2	4.1	4.0
51	9.18 709	81	9.19 229	83	0.80 771	9.99 480	9	4	5.5	5.5	5.4
52	9.18 790	81	9.19 312	83	0.80 688	9.99 478	8	5	6.9	6.8	6.8
53	9.18 871	81	9.19 395	83	0.80 605	9.99 476	7	6	8.3	8.2	8.1
54	9.18 952	81	9.19 478	83	0.80 522	9.99 474	6	7	9.7	9.6	9.4
55	9.19 033	80	9.19 561	82	0.80 439	9.99 472	5	8	11.1	10.9	10.8
56	9.19 113	80	9.19 643	82	0.80 357	9.99 470	4	9	12.4	12.3	12.2
57	9.19 193	80	9.19 725	82	0.80 275	9.99 468	3	10	13.8	13.7	13.5
58	9.19 273	80	9.19 807	82	0.80 193	9.99 466	2	20	27.7	27.3	27.0
59	9.19 353	80	9.19 889	82	0.80 111	9.99 464	1	30	41.5	41.0	40.5
60	9.19 433		9.19 971		0.80 029	9.99 462	0	40	55.3	54.7	54.0
								50	69.2	68.3	67.5
	L Cos	d	L Cot	c d	L Tan	L Sin		P	P		

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′	L Sin	d	L Tan	c d	L Cot	L Cos	
0	9.19 433	80	9.19 971	82	0.80 029	9.99 462	60
1	9.19 513	79	9.20 053	81	0.79 947	9.99 460	59
2	9.19 592	80	9.20 134	82	0.79 866	9.99 458	58
3	9.19 672	79	9.20 216	81	0.79 784	9.99 456	57
4	9.19 751	79	9.20 297	81	0.79 703	9.99 454	56
5	9.19 830	79	9.20 378	81	0.79 622	9.99 452	55
6	9.19 909	79	9.20 459	81	0.79 541	9.99 450	54
7	9.19 988	79	9.20 540	81	0.79 460	9.99 448	53
8	9.20 067	78	9.20 621	80	0.79 379	9.99 446	52
9	9.20 145	78	9.20 701	81	0.79 299	9.99 444	51
10	9.20 223	79	9.20 782	80	0.79 218	9.99 442	50
11	9.20 302	78	9.20 862	80	0.79 138	9.99 440	49
12	9.20 380	78	9.20 942	80	0.79 058	9.99 438	48
13	9.20 458	77	9.21 022	80	0.78 978	9.99 436	47
14	9.20 535	78	9.21 102	80	0.78 898	9.99 434	46
15	9.20 613	78	9.21 182	79	0.78 818	9.99 432	45
16	9.20 691	77	9.21 261	80	0.78 739	9.99 429	44
17	9.20 768	77	9.21 341	79	0.78 659	9.99 427	43
18	9.20 845	77	9.21 420	79	0.78 580	9.99 425	42
19	9.20 922	77	9.21 499	79	0.78 501	9.99 423	41
20	9.20 999	77	9.21 578	79	0.78 422	9.99 421	40
21	9.21 076	77	9.21 657	79	0.78 343	9.99 419	39
22	9.21 153	76	9.21 736	78	0.78 264	9.99 417	38
23	9.21 229	77	9.21 814	79	0.78 186	9.99 415	37
24	9.21 306	76	9.21 893	78	0.78 107	9.99 413	36
25	9.21 382	76	9.21 971	78	0.78 029	9.99 411	35
26	9.21 458	76	9.22 049	78	0.77 951	9.99 409	34
27	9.21 534	76	9.22 127	78	0.77 873	9.99 407	33
28	9.21 610	75	9.22 205	78	0.77 795	9.99 404	32
29	9.21 685	76	9.22 283	78	0.77 717	9.99 402	31
30	9.21 761	75	9.22 361	77	0.77 639	9.99 400	30
31	9.21 836	76	9.22 438	78	0.77 562	9.99 398	29
32	9.21 912	75	9.22 516	77	0.77 484	9.99 396	28
33	9.21 987	75	9.22 593	77	0.77 407	9.99 394	27
34	9.22 062	75	9.22 670	77	0.77 330	9.99 392	26
35	9.22 137	74	9.22 747	77	0.77 253	9.99 390	25
36	9.22 211	75	9.22 824	77	0.77 176	9.99 388	24
37	9.22 286	75	9.22 901	76	0.77 099	9.99 385	23
38	9.22 361	74	9.22 977	77	0.77 023	9.99 383	22
39	9.22 435	74	9.23 054	76	0.76 946	9.99 381	21
40	9.22 509	74	9.23 130	76	0.76 870	9.99 379	20
41	9.22 583	74	9.23 206	77	0.76 794	9.99 377	19
42	9.22 657	74	9.23 283	76	0.76 717	9.99 375	18
43	9.22 731	74	9.23 359	76	0.76 641	9.99 372	17
44	9.22 805	73	9.23 435	75	0.76 565	9.99 370	16
45	9.22 878	74	9.23 510	76	0.76 490	9.99 368	15
46	9.22 952	73	9.23 586	75	0.76 414	9.99 366	14
47	9.23 025	73	9.23 661	76	0.76 339	9.99 364	13
48	9.23 098	73	9.23 737	75	0.76 263	9.99 362	12
49	9.23 171	73	9.23 812	75	0.76 188	9.99 359	11
50	9.23 244	73	9.23 887	75	0.76 113	9.99 357	10
51	9.23 317	73	9.23 962	75	0.76 038	9.99 355	9
52	9.23 390	72	9.24 037	75	0.75 963	9.99 353	8
53	9.23 462	73	9.24 112	75	0.75 888	9.99 351	7
54	9.23 535	72	9.24 186	74	0.75 814	9.99 348	6
55	9.23 607	72	9.24 261	75	0.75 739	9.99 346	5
56	9.23 679	73	9.24 335	74	0.75 665	9.99 344	4
57	9.23 752	71	9.24 410	75	0.75 590	9.99 342	3
58	9.23 823	72	9.24 484	74	0.75 516	9.99 340	2
59	9.23 895	72	9.24 558	74	0.75 442	9.99 337	1
60	9.23 967		9.24 632	74	0.75 368	9.99 335	0
	L Cos	d	L Cot	c d	L Tan	L Sin	

P P

	80	79	78	77
1	1.3	1.3	1.3	1.3
2	2.7	2.6	2.6	2.6
3	4.0	4.0	3.9	3.8
4	5.3	5.3	5.2	5.1
5	6.7	6.6	6.5	6.4
6	8.0	7.9	7.8	7.7
7	9.3	9.2	9.1	9.0
8	10.7	10.5	10.4	10.3
9	12.0	11.8	11.7	11.6
10	13.3	13.2	13.0	12.8
20	26.7	26.3	26.0	25.7
30	40.0	39.5	39.0	38.5
40	53.3	52.7	52.0	51.3
50	66.7	65.8	65.0	64.2

	76	75	74	73
1	1.3	1.2	1.2	1.2
2	2.5	2.5	2.5	2.4
3	3.8	3.8	3.7	3.6
4	5.1	5.0	4.9	4.9
5	6.3	6.2	6.2	6.1
6	7.6	7.5	7.4	7.3
7	8.9	8.8	8.6	8.5
8	10.1	10.0	9.9	9.7
9	11.4	11.2	11.1	11.0
10	12.7	12.5	12.3	12.2
20	25.3	25.0	24.7	24.3
30	38.0	37.5	37.0	36.5
40	50.7	50.0	49.3	48.7
50	63.3	62.5	61.7	60.8

	72	71	3	2
1	1.2	1.2	0.0	0.0
2	2.4	2.4	0.1	0.1
3	3.6	3.6	0.2	0.1
4	4.8	4.7	0.2	0.1
5	6.0	5.9	0.2	0.2
6	7.2	7.1	0.3	0.2
7	8.4	8.3	0.4	0.2
8	9.6	9.5	0.4	0.3
9	10.8	10.6	0.4	0.3
10	12.0	11.8	0.5	0.3
20	24.0	23.7	1.0	0.7
30	36.0	35.5	1.5	1.0
40	48.0	47.3	2.0	1.3
50	60.0	59.2	2.5	1.7

	3/79	3/78	3/77
0			
1	13.2	13.0	12.8
2	39.5	39.0	38.5
3	65.8	65.0	64.2

	3/76	3/75	3/74
0			
1	12 7	12.5	12.3
2	38.0	37.5	37.0
3	63.3	62.5	61.7

P P

*170° 260° *350°

80°

10°

*100° 190° *280°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.23 967	72	9.24 632	74	0.75 368	9.99 335	2	60
1	9.24 039	71	9.24 706	73	0.75 294	9.99 333	2	59
2	9.24 110	71	9.24 779	74	0.75 221	9.99 331	3	58
3	9.24 181	72	9.24 853	73	0.75 147	9.99 328	2	57
4	9.24 253	71	9.24 926	74	0.75 074	9.99 326	2	56
5	9.24 324	71	9.2$\bar{5}$ 000	73	0.75 000	9.99 324	2	55
6	9.24 39$\bar{5}$	71	9.25 073	73	0.74 927	9.99 322	3	54
7	9.24 466	70	9.25 146	73	0.74 854	9.99 319	2	53
8	9.24 536	71	9.25 219	73	0.74 781	9.99 317	2	52
9	9.24 607	70	9.25 292	73	0.74 708	9.99 31$\bar{5}$	2	51
10	9.24 677	71	9.25 36$\bar{5}$	72	0.74 635	9.99 313	3	50
11	9.24 748	70	9.25 437	73	0.74 563	9.99 310	2	49
12	9.24 818	70	9.25 510	72	0.74 490	9.99 308	2	48
13	9.24 888	70	9.25 582	73	0.74 418	9.99 306	2	47
14	9.24 958	70	9.25 65$\bar{5}$	72	0.74 345	9.99 304	3	46
15	9.25 028	70	9.25 727	72	0.74 273	9.99 301	2	45
16	9.25 098	70	9.25 799	72	0.74 201	9.99 299	2	44
17	9.25 168	69	9.25 871	72	0.74 129	9.99 297	3	43
18	9.25 237	70	9.25 943	72	0.74 057	9.99 294	2	42
19	9.25 307	69	9.26 01$\bar{5}$	71	0.73 985	9.99 292	2	41
20	9.25 376	69	9.26 086	72	0.73 914	9.99 290	2	40
21	9.25 445	69	9.26 158	71	0.73 842	9.99 288	3	39
22	9.25 514	69	9.26 229	72	0.73 771	9.99 285	2	38
23	9.25 583	69	9.26 301	71	0.73 699	9.99 283	2	37
24	9.25 652	69	9.26 372	71	0.73 628	9.99 281	3	36
25	9.25 721	69	9.26 443	71	0.73 557	9.99 278	2	35
26	9.25 790	68	9.26 514	71	0.73 486	9.99 276	2	34
27	9.25 858	69	9.26 58$\bar{5}$	70	0.73 415	9.99 274	3	33
28	9.25 927	68	9.26 655	71	0.73 34$\bar{5}$	9.99 271	2	32
29	9.25 995	68	9.26 726	71	0.73 274	9.99 269	2	31
30	9.26 063	68	9.26 797	70	0.73 203	9.99 267	3	30
31	9.26 131	68	9.26 867	70	0.73 133	9.99 264	2	29
32	9.26 199	68	9.26 937	71	0.73 063	9.99 262	2	28
33	9.26 267	68	9.27 008	70	0.72 992	9.99 260	3	27
34	9.26 335	68	9.27 078	70	0.72 922	9.99 257	2	26
35	9.26 403	67	9.27 148	70	0.72 852	9.99 25$\bar{5}$	3	25
36	9.26 470	68	9.27 218	70	0.72 782	9.99 252	2	24
37	9.26 538	67	9.27 288	69	0.72 712	9.99 250	2	23
38	9.26 605	67	9.27 357	70	0.72 643	9.99 248	3	22
39	9.26 672	67	9.27 427	69	0.72 573	9.99 245	2	21
40	9.26 739	67	9.27 496	70	0.72 504	9.99 243	2	20
41	9.26 806	67	9.27 566	69	0.72 434	9.99 241	3	19
42	9.26 873	67	9.27 635	69	0.72 36$\bar{5}$	9.99 238	2	18
43	9.26 940	67	9.27 704	69	0.72 296	9.99 236	3	17
44	9.27 007	66	9.27 773	69	0.72 227	9.99 233	2	16
45	9.27 073	67	9.27 842	69	0.72 158	9.99 231	2	15
46	9.27 140	66	9.27 911	69	0.72 089	9.99 229	3	14
47	9.27 206	67	9.27 980	69	0.72 020	9.99 226	2	13
48	9.27 273	66	9.28 049	68	0.71 951	9.99 224	3	12
49	9.27 339	66	9.28 117	69	0.71 883	9.99 221	2	11
50	9.27 40$\bar{5}$	66	9.28 186	68	0.71 814	9.99 219	2	10
51	9.27 471	66	9.28 254	69	0.71 746	9.99 217	3	9
52	9.27 537	65	9.28 323	68	0.71 677	9.99 214	2	8
53	9.27 602	66	9.28 391	68	0.71 609	9.99 212	3	7
54	9.27 668	66	9.28 459	68	0.71 541	9.99 209	2	6
55	9.27 734	65	9.28 527	68	0.71 473	9.99 207	3	5
56	9.27 799	65	9.28 59$\bar{5}$	67	0.71 405	9.99 204	2	4
57	9.27 864	66	9.28 662	68	0.71 338	9.99 202	2	3
58	9.27 930	65	9.28 730	68	0.71 270	9.99 200	3	2
59	9.27 99$\bar{5}$	65	9.28 798	67	0.71 202	9.99 197	2	1
60	9.28 060		9.28 865		0.71 13$\bar{5}$	9.99 19$\bar{5}$		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P

	74	73	72
1	1.2	1.2	1.2
2	2.$\bar{5}$	2.4	2.4
3	3.7	3.6	3.6
4	4.9	4.9	4.8
5	6.2	6.1	6.0
6	7.4	7.3	7.2
7	8.6	8.5	8.4
8	9.9	9.7	9.6
9	11.1	11.0	10.8
10	12.3	12.2	12.0
20	24.7	24.3	24.0
30	37.0	36.5	36.0
40	49.3	48.7	48.0
50	61.7	60.8	60.0

	71	70	69
1	1.2	1.2	1.2
2	2.4	2.3	2.3
3	3.6	3.5	3.4
4	4.7	4.7	4.6
5	5.9	5.8	5.8
6	7.1	7.0	6.9
7	8.3	8.2	8.0
8	9.$\bar{5}$	9.3	9.2
9	10.6	10.5	10.4
10	11.8	11.7	11.5
20	23.7	23.3	23.0
30	35.5	35.0	34.5
40	47.3	46.7	46.0
50	59.2	58.3	57.5

	68	67	66
1	1.1	1.1	1.1
2	2.3	2.2	2.2
3	3.4	3.4	3.3
4	4.5	4.$\bar{5}$	4.4
5	5.7	5.6	5.5
6	6.8	6.7	6.6
7	7.9	7.8	7.7
8	9.1	8.9	8.8
9	10.2	10.0	9.9
10	11.3	11.2	11.0
20	22.7	22.3	22.0
30	34.0	33.5	33.0
40	45.3	44.7	44.0
50	56.7	55.8	55.0

	$\frac{3}{74}$	$\frac{3}{73}$	$\frac{3}{72}$
0			
1	12.3	12.2	12.0
2	37.0	36.5	36.0
3	61.7	60.8	60.0

	$\frac{3}{71}$	$\frac{3}{70}$	$\frac{3}{69}$	$\frac{3}{68}$
0				
1	11.8	11.7	11.5	11.3
2	35.5	35.0	34.5	34.0
3	59.2	58.3	57.5	56.7

P P

*169° 259° *349° 79°

11°

*101° 191° *281°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.28 060		9.28 865		0.71 135	9.99 195		60
		65		68			3	
1	9.28 125	65	9.28 933	67	0.71 067	9.99 192	2	59
2	9.28 190	64	9.29 000	67	0.71 000	9.99 190	3	58
3	9.28 254	65	9.29 067	67	0.70 933	9.99 187	2	57
4	9.28 319	65	9.29 134	67	0.70 866	9.99 185	3	56
5	9.28 384	64	9.29 201	67	0.70 799	9.99 182	2	55
6	9.28 448	64	9.29 268	67	0.70 732	9.99 180	3	54
7	9.28 512	65	9.29 335	67	0.70 665	9.99 177	2	53
8	9.28 577	64	9.29 402	66	0.70 598	9.99 175	3	52
9	9.28 641	64	9.29 468	67	0.70 532	9.99 172	2	51
10	9.28 705	64	9.29 535	66	0.70 465	9.99 170	3	50
11	9.28 769	64	9.29 601	67	0.70 399	9.99 167	2	49
12	9.28 833	63	9.29 668	66	0.70 332	9.99 165	3	48
13	9.28 896	64	9.29 734	66	0.70 266	9.99 162	2	47
14	9.28 960	64	9.29 800	66	0.70 200	9.99 160	3	46
15	9.29 024	63	9.29 866	66	0.70 134	9.99 157	2	45
16	9.29 087	63	9.29 932	66	0.70 068	9.99 155	3	44
17	9.29 150	64	9.29 998	66	0.70 002	9.99 152	2	43
18	9.29 214	63	9.30 064	66	0.69 936	9.99 150	3	42
19	9.29 277	63	9.30 130	65	0.69 870	9.99 147	2	41
20	9.29 340	63	9.30 195	66	0.69 805	9.99 145	3	40
21	9.29 403	63	9.30 261	65	0.69 739	9.99 142	2	39
22	9.29 466	63	9.30 326	65	0.69 674	9.99 140	3	38
23	9.29 529	62	9.30 391	66	0.69 609	9.99 137	2	37
24	9.29 591	63	9.30 457	65	0.69 543	9.99 135	3	36
25	9.29 654	62	9.30 522	65	0.69 478	9.99 132	2	35
26	9.29 716	63	9.30 587	65	0.69 413	9.99 130	3	34
27	9.29 779	62	9.30 652	65	0.69 348	9.99 127	3	33
28	9.29 841	62	9.30 717	65	0.69 283	9.99 124	2	32
29	9.29 903	63	9.30 782	64	0.69 218	9.99 122	3	31
30	9.29 966	62	9.30 846	65	0.69 154	9.99 119	2	30
31	9.30 028	62	9.30 911	64	0.69 089	9.99 117	3	29
32	9.30 090	61	9.30 975	65	0.69 025	9.99 114	2	28
33	9.30 151	62	9.31 040	64	0.68 960	9.99 112	3	27
34	9.30 213	62	9.31 104	64	0.68 896	9.99 109	3	26
35	9.30 275	61	9.31 168	64	0.68 832	9.99 106	2	25
36	9.30 336	62	9.31 233	64	0.68 767	9.99 104	3	24
37	9.30 398	61	9.31 297	64	0.68 703	9.99 101	2	23
38	9.30 459	62	9.31 361	64	0.68 639	9.99 099	3	22
39	9.30 521	61	9.31 425	64	0.68 575	9.99 096	3	21
40	9.30 582	61	9.31 489	63	0.68 511	9.99 093	2	20
41	9.30 643	61	9.31 552	64	0.68 448	9.99 091	3	19
42	9.30 704	61	9.31 616	63	0.68 384	9.99 088	2	18
43	9.30 765	61	9.31 679	64	0.68 321	9.99 086	3	17
44	9.30 826	61	9.31 743	63	0.68 257	9.99 083	3	16
45	9.30 887	60	9.31 806	64	0.68 194	9.99 080	2	15
46	9.30 947	61	9.31 870	63	0.68 130	9.99 078	3	14
47	9.31 008	60	9.31 933	63	0.68 067	9.99 075	3	13
48	9.31 068	61	9.31 996	63	0.68 004	9.99 072	2	12
49	9.31 129	60	9.32 059	63	0.67 941	9.99 070	3	11
50	9.31 189	61	9.32 122	63	0.67 878	9.99 067	3	10
51	9.31 250	60	9.32 185	63	0.67 815	9.99 064	2	9
52	9.31 310	60	9.32 248	63	0.67 752	9.99 062	3	8
53	9.31 370	60	9.32 311	62	0.67 689	9.99 059	3	7
54	9.31 430	60	9.32 373	63	0.67 627	9.99 056	2	6
55	9.31 490	59	9.32 436	62	0.67 564	9.99 054	3	5
56	9.31 549	60	9.32 498	63	0.67 502	9.99 051	3	4
57	9.31 609	60	9.32 561	62	0.67 439	9.99 048	2	3
58	9.31 669	59	9.32 623	62	0.67 377	9.99 046	3	2
59	9.31 728	60	9.32 685	62	0.67 315	9.99 043	3	1
60	9.31 788		9.32 747		0.67 253	9.99 040		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P		
	65	64	63
1	1.1	1.1	1.0
2	2.2	2.1	2.1
3	3.2	3.2	3.2
4	4.3	4.3	4.2
5	5.4	5.3	5.2
6	6.5	6.4	6.3
7	7.6	7.5	7.4
8	8.7	8.5	8.4
9	9.8	9.6	9.4
10	10.8	10.7	10.5
20	21.7	21.3	21.0
30	32.5	32.0	31.5
40	43.3	42.7	42.0
50	54.2	53.3	52.5
	62	61	60
1	1.0	1.0	1.0
2	2.1	2.0	2.0
3	3.1	3.0	3.0
4	4.1	4.1	4.0
5	5.2	5.1	5.0
6	6.2	6.1	6.0
7	7.2	7.1	7.0
8	8.3	8.1	8.0
9	9.3	9.2	9.0
10	10.3	10.2	10.0
20	20.7	20.3	20.0
30	31.0	30.5	30.0
40	41.3	40.7	40.0
50	51.7	50.8	50.0
	59	3	2
1	1.0	0.0	0.0
2	2.0	0.1	0.1
3	3.0	0.2	0.1
4	3.9	0.2	0.1
5	4.9	0.2	0.2
6	5.9	0.3	0.2
7	6.9	0.4	0.2
8	7.9	0.4	0.3
9	8.8	0.4	0.3
10	9.8	0.5	0.3
20	19.7	1.0	0.7
30	29.5	1.5	1.0
40	39.3	2.0	1.3
50	49.2	2.5	1.7
	3/67	3/66	3/65
0	11.2	11.0	10.8
1	33.5	33.0	32.5
2	55.8	55.0	54.2
3			
	3/64	3/63	3/62
0	10.7	10.5	10.3
1	32.0	31.5	31.0
2	53.3	52.5	51.7
3			

P	P

12°

*102° 192° *282°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.31 788		9.32 747		0.67 253	9.99 040		60
		59		63			2	
1	9.31 847	60	9.32 810	62	0.67 190	9.99 038		59
2	9.31 907		9.32 872	61	0.67 128	9.99 035	3	58
		59					3	
3	9.31 966	59	9.32 933	62	0.67 067	9.99 032	2	57
4	9.32 025	59	9.32 995	62	0.67 005	9.99 030		56
5	9.32 084	59	9.33 057	62	0.66 943	9.99 027	3	55
6	9.32 143	59	9.33 119	61	0.66 881	9.99 024	3	54
7	9.32 202	59	9.33 180	62	0.66 820	9.99 022	2	53
8	9.32 261	58	9.33 242	61	0.66 758	9.99 019	3	52
9	9.32 319	59	9.33 303	62	0.66 697	9.99 016	3	51
10	9.32 378	59	9.33 365	61	0.66 635	9.99 013	3	50
11	9.32 437	58	9.33 426	61	0.66 574	9.99 011	2	49
12	9.32 495	58	9.33 487	61	0.66 513	9.99 008	3	48
13	9.32 553	59	9.33 548	61	0.66 452	9.99 005	3	47
14	9.32 612	58	9.33 609	61	0.66 391	9.99 002	3	46
15	9.32 670	58	9.33 670	61	0.66 330	9.99 000	2	45
16	9.32 728	58	9.33 731	61	0.66 269	9.98 997	3	44
17	9.32 786	58	9.33 792	61	0.66 208	9.98 994	3	43
18	9.32 844	58	9.33 853	60	0.66 147	9.98 991	3	42
19	9.32 902	58	9.33 913	61	0.66 087	9.98 989	2	41
20	9.32 960	58	9.33 974	60	0.66 026	9.98 986	3	40
21	9.33 018	57	9.34 034	61	0.65 966	9.98 983	3	39
22	9.33 075	58	9.34 095	60	0.65 905	9.98 980	2	38
23	9.33 133	57	9.34 155	60	0.65 845	9.98 978	3	37
24	9.33 190	58	9.34 215	61	0.65 785	9.98 975	3	36
25	9.33 248	57	9.34 276	60	0.65 724	9.98 972	3	35
26	9.33 305	57	9.34 336	60	0.65 664	9.98 969	2	34
27	9.33 362	58	9.34 396	60	0.65 604	9.98 967	3	33
28	9.33 420	57	9.34 456	60	0.65 544	9.98 964	3	32
29	9.33 477	57	9.34 516	60	0.65 484	9.98 961	3	31
30	9.33 534	57	9.34 576	59	0.65 424	9.98 958	3	30
31	9.33 591	56	9.34 635	60	0.65 365	9.98 955	2	29
32	9.33 647	57	9.34 695	60	0.65 305	9.98 953	3	28
33	9.33 704	57	9.34 755	59	0.65 245	9.98 950	3	27
34	9.33 761	57	9.34 814	60	0.65 186	9.98 947	3	26
35	9.33 818	56	9.34 874	59	0.65 126	9.98 944	3	25
36	9.33 874	57	9.34 933	59	0.65 067	9.98 941	3	24
37	9.33 931	56	9.34 992	59	0.65 008	9.98 938	2	23
38	9.33 987	56	9.35 051	60	0.64 949	9.98 936	3	22
39	9.34 043	57	9.35 111	59	0.64 889	9.98 933	3	21
40	9.34 100	56	9.35 170	59	0.64 830	9.98 930	3	20
41	9.34 156	56	9.35 229	59	0.64 771	9.98 927	3	19
42	9.34 212	56	9.35 288	59	0.64 712	9.98 924	3	18
43	9.34 268	56	9.35 347	58	0.64 653	9.98 921	2	17
44	9.34 324	56	9.35 405	59	0.64 595	9.98 919	3	16
45	9.34 380	56	9.35 464	59	0.64 536	9.98 916	3	15
46	9.34 436	55	9.35 523	58	0.64 477	9.98 913	3	14
47	9.34 491	56	9.35 581	59	0.64 419	9.98 910	3	13
48	9.34 547	55	9.35 640	58	0.64 360	9.98 907	3	12
49	9.34 602	56	9.35 698	59	0.64 302	9.98 904	3	11
50	9.34 658	55	9.35 757	58	0.64 243	9.98 901	3	10
51	9.34 713	56	9.35 815	58	0.64 185	9.98 898	2	9
52	9.34 769	55	9.35 873	58	0.64 127	9.98 896	3	8
53	9.34 824	55	9.35 931	58	0.64 069	9.98 893	3	7
54	9.34 879	55	9.35 989	58	0.64 011	9.98 890	3	6
55	9.34 934	55	9.36 047	58	0.63 953	9.98 887	3	5
56	9.34 989	55	9.36 105	58	0.63 895	9.98 884	3	4
57	9.35 044	55	9.36 163	58	0.63 837	9.98 881	3	3
58	9.35 099	55	9.36 221	58	0.63 779	9.98 878	3	2
59	9.35 154	55	9.36 279	57	0.63 721	9.98 875	3	1
60	9.35 209		9.36 336		0.63 664	9.98 872		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

P P			
	63	62	61
1	1.0	1.0	1.0
2	2.1	2.1	2.0
3	3.2	3.1	3.0
4	4.2	4.1	4.1
5	5.2	5.2	5.1
6	6.3	6.2	6.1
7	7.4	7.2	7.1
8	8.4	8.3	8.1
9	9.4	9.3	9.2
10	10.5	10.3	10.2
20	21.0	20.7	20.3
30	31.5	31.0	30.5
40	42.0	41.3	40.7
50	52.5	51.7	50.8

	60	59	58
1	1.0	1.0	1.0
2	2.0	2.0	1.9
3	3.0	3.0	2.9
4	4.0	3.9	3.9
5	5.0	4.9	4.8
6	6.0	5.9	5.8
7	7.0	6.9	6.8
8	8.0	7.9	7.7
9	9.0	8.8	8.7
10	10.0	9.8	9.7
20	20.0	19.7	19.3
30	30.0	29.5	29.0
40	40.0	39.3	38.7
50	50.0	49.2	48.3

	57	56	55
1	1.0	0.9	0.9
2	1.9	1.9	1.8
3	2.8	2.8	2.8
4	3.8	3.7	3.7
5	4.8	4.7	4.6
6	5.7	5.6	5.5
7	6.6	6.5	6.4
8	7.6	7.5	7.3
9	8.6	8.4	8.2
10	9.5	9.3	9.2
20	19.0	18.7	18.3
30	28.5	28.0	27.5
40	38.0	37.3	36.7
50	47.5	46.7	45.8

	3	3	3
	62	61	60
0			
1	10.3	10.2	10.0
2	31.0	30.5	30.0
3	51.7	50.8	50.0

	3	3	3
	59	58	57
0			
1	9.8	9.7	9.5
2	29.5	29.0	28.5
3	49.2	48.3	47.5

P P

*167° 257° *347°

77°

13°

*103° 193° *283°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d		P	P		
0	9.35 209		9.36 336		0.63 664	9.98 872		60		57.	56	55
		54		58			3		1	1.0	0.9	0.9
1	9.35 263		9.36 394		0.63 606	9.98 869		59	2	1.9	1.9	1.8
		55		58			2		3	2.8	2.8	2.8
2	9.35 318		9.36 452		0.63 548	9.98 867		58				
		54		57			3		4	3.8	3.7	3.7
3	9.35 373		9.36 509		0.63 491	9.98 864		57	5	4.8	4.7	4.6
		54		57			3		6	5.7	5.6	5.5
4	9.35 427		9.36 566		0.63 434	9.98 861		56				
		54		58			3		7	6.6	6.5	6.4
5	9.35 481		9.36 624		0.63 376	9.98 858		55	8	7.6	7.5	7.3
		55		57			3		9	8.6	8.4	8.2
6	9.35 536		9.36 681		0.63 319	9.98 855		54				
		54		57			3		10	9.5	9.3	9.2
7	9.35 590		9.36 738		0.63 262	9.98 852		53	20	19.0	18.7	18.3
		54		57			3		30	28.5	28.0	27.5
8	9.35 644		9.36 795		0.63 205	9.98 849		52	40	38.0	37.3	36.7
		54		57			3		50	47.5	46.7	45.8
9	9.35 698		9.36 852		0.63 148	9.98 846		51				
		54		57			3					
10	9.35 752		9.36 909		0.63 091	9.98 843		50		54	53	52
		54		57			3		1	0.9	0.9	0.9
11	9.35 806		9.36 966		0.63 034	9.98 840		49	2	1.8	1.8	1.7
		54		57			3		3	2.7	2.6	2.6
12	9.35 860		9.37 023		0.62 977	9.98 837		48				
		54		57			3		4	3.6	3.5	3.5
13	9.35 914		9.37 080		0.62 920	9.98 834		47	5	4.5	4.4	4.3
		54		57			3		6	5.4	5.3	5.2
14	9.35 968		9.37 137		0.62 863	9.98 831		46				
		54		56			3		7	6.3	6.2	6.1
15	9.36 022		9.37 193		0.62 807	9.98 828		45	8	7.2	7.1	6.9
		53		57			3		9	8.1	8.0	7.8
16	9.36 075		9.37 250		0.62 750	9.98 825		44				
		54		56			3		10	9.0	8.8	8.7
17	9.36 129		9.37 306		0.62 694	9.98 822		43	20	18.0	17.7	17.3
		53		57			3		30	27.0	26.5	26.0
18	9.36 182		9.37 363		0.62 637	9.98 819		42	40	36.0	35.3	34.7
		54		56			3		50	45.0	44.2	43.3
19	9.36 236		9.37 419		0.62 581	9.98 816		41				
		53		57			3					
20	9.36 289		9.37 476		0.62 524	9.98 813		40		51	4	3	2
		53		56			3		1	0.8	0.1	0.0	0.0
21	9.36 342		9.37 532		0.62 468	9.98 810		39	2	1.7	0.1	0.1	0.1
		53		56			3		3	2.6	0.2	0.2	0.1
22	9.36 395		9.37 588		0.62 412	9.98 807		38					
		54		56			3		4	3.4	0.3	0.2	0.1
23	9.36 449		9.37 644		0.62 356	9.98 804		37	5	4.2	0.3	0.2	0.2
		53		56			3		6	5.1	0.4	0.3	0.2
24	9.36 502		9.37 700		0.62 300	9.98 801		36					
		53		56			3		7	6.0	0.5	0.4	0.2
25	9.36 555		9.37 756		0.62 244	9.98 798		35	8	6.8	0.5	0.4	0.3
		53		56			3		9	7.6	0.6	0.4	0.3
26	9.36 608		9.37 812		0.62 188	9.98 795		34					
		52		56			3		10	8.5	0.7	0.5	0.3
27	9.36 660		9.37 868		0.62 132	9.98 792		33	20	17.0	1.3	1.0	0.7
		53		56			3		30	25.5	2.0	1.5	1.0
28	9.36 713		9.37 924		0.62 076	9.98 789		32	40	34.0	2.7	2.0	1.3
		53		56			3		50	42.5	3.3	2.5	1.7
29	9.36 766		9.37 980		0.62 020	9.98 786		31					
		53		55			3						
30	9.36 819		9.38 035		0.61 965	9.98 783		30		$\frac{4}{55}$	$\frac{4}{54}$	$\frac{3}{58}$	$\frac{3}{57}$
		52		56			3		0	6.9	6.8	9.7	9.5
31	9.36 871		9.38 091		0.61 909	9.98 780		29	1	20.6	20.2	29.0	28.5
		53		56			3		2	34.4	33.8	48.3	47.5
32	9.36 924		9.38 147		0.61 853	9.98 777		28	3	48.1	47.2	—	—
		52		55			3		4				
33	9.36 976		9.38 202		0.61 798	9.98 774		27					
		52		55			3			$\frac{3}{56}$	$\frac{3}{55}$	$\frac{3}{54}$	
34	9.37 028		9.38 257		0.61 743	9.98 771		26	0	9.3	9.2	9.0	
		53		56			3		1	28.0	27.5	27.0	
35	9.37 081		9.38 313		0.61 687	9.98 768		25	2	46.7	45.8	45.0	
		52		55			3		3				
36	9.37 133		9.38 368		0.61 632	9.98 765		24					
		52		55			3						
37	9.37 185		9.38 423		0.61 577	9.98 762		23					
		52		56			3						
38	9.37 237		9.38 479		0.61 521	9.98 759		22					
		52		55			3						
39	9.37 289		9.38 534		0.61 466	9.98 756		21					
		52		55			3						
40	9.37 341		9.38 589		0.61 411	9.98 753		20					
		52		55			3						
41	9.37 393		9.38 644		0.61 356	9.98 750		19					
		52		55			4						
42	9.37 445		9.38 699		0.61 301	9.98 746		18					
		52		55			3						
43	9.37 497		9.38 754		0.61 246	9.98 743		17					
		52		54			3						
44	9.37 549		9.38 808		0.61 192	9.98 740		16					
		51		55			3						
45	9.37 600		9.38 863		0.61 137	9.98 737		15					
		52		55			3						
46	9.37 652		9.38 918		0.61 082	9.98 734		14					
		51		54			3						
47	9.37 703		9.38 972		0.61 028	9.98 731		13					
		52		55			3						
48	9.37 755		9.39 027		0.60 973	9.98 728		12					
		51		55			3						
49	9.37 806		9.39 082		0.60 918	9.98 725		11					
		52		54			3						
50	9.37 858		9.39 136		0.60 864	9.98 722		10					
		51		54			3						
51	9.37 909		9.39 190		0.60 810	9.98 719		9					
		51		55			4						
52	9.37 960		9.39 245		0.60 755	9.98 715		8					
		51		54			3						
53	9.38 011		9.39 299		0.60 701	9.98 712		7					
		51		54			3						
54	9.38 062		9.39 353		0.60 647	9.98 709		6					
		51		54			3						
55	9.38 113		9.39 407		0.60 593	9.98 706		5					
		51		54			3						
56	9.38 164		9.39 461		0.60 539	9.98 703		4					
		51		54			3						
57	9.38 215		9.39 515		0.60 485	9.98 700		3					
		51		54			3						
58	9.38 266		9.39 569		0.60 431	9.98 697		2					
		51		54			3						
59	9.38 317		9.39 623		0.60 377	9.98 694		1					
		51		54			3						
60	9.38 368		9.39 677		0.60 323	9.98 690		0					
	L Cos	d	L Cot	c d	L Tan	L Sin	d		P	P		

*166° 256° *346°

76°

14°

*104° 194° *284°

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.38 368	50	9.39 677	54	0.60 323	9.98 690	3	60
1	9.38 418	51	9.39 731	54	0.60 269	9.98 687	3	59
2	9.38 469	50	9.39 785	53	0.60 215	9.98 684	3	58
3	9.38 519	51	9.39 838	54	0.60 162	9.98 681	3	57
4	9.38 570	50	9.39 892	53	0.60 108	9.98 678	3	56
5	9.38 620	50	9.39 945	54	0.60 055	9.98 675	4	55
6	9.38 670	51	9.39 999	53	0.60 001	9.98 671	3	54
7	9.38 721	50	9.40 052	54	0.59 948	9.98 668	3	53
8	9.38 771	50	9.40 106	53	0.59 894	9.98 665	3	52
9	9.38 821	50	9.40 159	53	0.59 841	9.98 662	3	51
10	9.38 871	50	9.40 212	54	0.59 788	9.98 659	3	50
11	9.38 921	50	9.40 266	53	0.59 734	9.98 656	4	49
12	9.38 971	50	9.40 319	53	0.59 681	9.98 652	4	48
13	9.39 021	50	9.40 372	53	0.59 628	9.98 649	3	47
14	9.39 071	50	9.40 425	53	0.59 575	9.98 646	3	46
15	9.39 121	49	9.40 478	53	0.59 522	9.98 643	3	45
16	9.39 170	50	9.40 531	53	0.59 469	9.98 640	4	44
17	9.39 220	50	9.40 584	52	0.59 416	9.98 636	3	43
18	9.39 270	49	9.40 636	53	0.59 364	9.98 633	3	42
19	9.39 319	50	9.40 689	53	0.59 311	9.98 630	3	41
20	9.39 369	49	9.40 742	53	0.59 258	9.98 627	4	40
21	9.39 418	49	9.40 795	52	0.59 205	9.98 623	3	39
22	9.39 467	50	9.40 847	53	0.59 153	9.98 620	3	38
23	9.39 517	49	9.40 900	52	0.59 100	9.98 617	3	37
24	9.39 566	49	9.40 952	53	0.59 048	9.98 614	4	36
25	9.39 615	49	9.41 005	52	0.58 995	9.98 610	3	35
26	9.39 664	49	9.41 057	52	0.58 943	9.98 607	3	34
27	9.39 713	49	9.41 109	52	0.58 891	9.98 604	3	33
28	9.39 762	49	9.41 161	53	0.58 839	9.98 601	4	32
29	9.39 811	49	9.41 214	52	0.58 786	9.98 597	3	31
30	9.39 860	49	9.41 266	52	0.58 734	9.98 594	3	30
31	9.39 909	49	9.41 318	52	0.58 682	9.98 591	3	29
32	9.39 958	48	9.41 370	52	0.58 630	9.98 588	4	28
33	9.40 006	49	9.41 422	52	0.58 578	9.98 584	3	27
34	9.40 055	48	9.41 474	52	0.58 526	9.98 581	3	26
35	9.40 103	49	9.41 526	52	0.58 474	9.98 578	4	25
36	9.40 152	48	9.41 578	51	0.58 422	9.98 574	3	24
37	9.40 200	49	9.41 629	52	0.58 371	9.98 571	3	23
38	9.40 249	48	9.41 681	52	0.58 319	9.98 568	3	22
39	9.40 297	49	9.41 733	51	0.58 267	9.98 565	4	21
40	9.40 346	48	9.41 784	52	0.58 216	9.98 561	3	20
41	9.40 394	48	9.41 836	51	0.58 164	9.98 558	3	19
42	9.40 442	48	9.41 887	52	0.58 113	9.98 555	4	18
43	9.40 490	48	9.41 939	51	0.58 061	9.98 551	3	17
44	9.40 538	48	9.41 990	51	0.58 010	9.98 548	3	16
45	9.40 586	48	9.42 041	52	0.57 959	9.98 545	4	15
46	9.40 634	48	9.42 093	51	0.57 907	9.98 541	3	14
47	9.40 682	48	9.42 144	51	0.57 856	9.98 538	3	13
48	9.40 730	48	9.42 195	51	0.57 805	9.98 535	4	12
49	9.40 778	47	9.42 246	51	0.57 754	9.98 531	3	11
50	9.40 825	48	9.42 297	51	0.57 703	9.98 528	3	10
51	9.40 873	48	9.42 348	51	0.57 652	9.98 525	4	9
52	9.40 921	47	9.42 399	51	0.57 601	9.98 521	3	8
53	9.40 968	48	9.42 450	51	0.57 550	9.98 518	3	7
54	9.41 016	47	9.42 501	51	0.57 499	9.98 515	4	6
55	9.41 063	48	9.42 552	51	0.57 448	9.98 511	3	5
56	9.41 111	47	9.42 603	50	0.57 397	9.98 508	3	4
57	9.41 158	47	9.42 653	51	0.57 347	9.98 505	4	3
58	9.41 205	47	9.42 704	51	0.57 296	9.98 501	3	2
59	9.41 252	48	9.42 755	50	0.57 245	9.98 498	4	1
60	9.41 300		9.42 805		0.57 195	9.98 494		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

*165° 255° *345°

75°

P	P		
	54	53	52
1	0.9	0.9	0.9
2	1.8	1.8	1.7
3	2.7	2.6	2.6
4	3.6	3.5	3.5
5	4.5	4.4	4.3
6	5.4	5.3	5.2
7	6.3	6.2	6.1
8	7.2	7.1	6.9
9	8.1	8.0	7.8
10	9.0	8.8	8.7
20	18.0	17.7	17.3
30	27.0	26.5	26.0
40	36.0	35.3	34.7
50	45.0	44.2	43.3
	51	50	49
1	0.8	0.8	0.8
2	1.7	1.7	1.6
3	2.6	2.5	2.4
4	3.4	3.3	3.3
5	4.2	4.2	4.1
6	5.1	5.0	4.9
7	6.0	5.8	5.7
8	6.8	6.7	6.5
9	7.6	7.5	7.4
10	8.5	8.3	8.2
20	17.0	16.7	16.3
30	25.5	25.0	24.5
40	34.0	33.3	32.7
50	42.5	41.7	40.8
	48	47	4	3
1	0.8	0.8	0.1	0.0
2	1.6	1.6	0.1	0.1
3	2.4	2.4	0.2	0.2
4	3.2	3.1	0.3	0.2
5	4.0	3.9	0.3	0.2
6	4.8	4.7	0.4	0.3
7	5.6	5.5	0.5	0.4
8	6.4	6.3	0.5	0.4
9	7.2	7.0	0.6	0.4
10	8.0	7.8	0.7	0.5
20	16.0	15.7	1.3	1.0
30	24.0	23.5	2.0	1.5
40	32.0	31.3	2.7	2.0
50	40.0	39.2	3.3	2.5
	4	4	4	4
	54	53	52	51
0	6.8	6.6	6.5	6.4
1	20.2	19.9	19.5	19.1
2	33.8	33.1	32.5	31.9
3	47.2	46.4	45.5	44.6
4				
	3	3	3	3
	54	53	52	51
0	9.0	8.8	8.7	8.5
1	27.0	26.5	26.0	25.5
2	45.0	44.2	43.3	42.5
3				

P P

15°

*105° 195° *285°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.41 300		9.42 805		0.57 195	9.98 494		60
		47		51			3	
1	9.41 347		9.42 856		0.57 144	9.98 491		59
		47		50			3	
2	9.41 394		9.42 906		0.57 094	9.98 488		58
		47		51			4	
3	9.41 441		9.42 957		0.57 043	9.98 484		57
		47		50			3	
4	9.41 488		9.43 007		0.56 993	9.98 481		56
		47		50			4	
5	9.41 535		9.43 057		0.56 943	9.98 477		55
		47		51			3	
6	9.41 582		9.43 108		0.56 892	9.98 474		54
		46		50			3	
7	9.41 628		9.43 158		0.56 842	9.98 471		53
		47		50			4	
8	9.41 675		9.43 208		0.56 792	9.98 467		52
		47		50			3	
9	9.41 722		9.43 258		0.56 742	9.98 464		51
		46		50			4	
10	9.41 768		9.43 308		0.56 692	9.98 460		50
		47		50			3	
11	9.41 815		9.43 358		0.56 642	9.98 457		49
		46		50			4	
12	9.41 861		9.43 408		0.56 592	9.98 453		48
		47		50			3	
13	9.41 908		9.43 458		0.56 542	9.98 450		47
		46		50			3	
14	9.41 954		9.43 508		0.56 492	9.98 447		46
		47		50			4	
15	9.42 001		9.43 558		0.56 442	9.98 443		45
		46		49			3	
16	9.42 047		9.43 607		0.56 393	9.98 440		44
		46		50			4	
17	9.42 093		9.43 657		0.56 343	9.98 436		43
		47		50			3	
18	9.42 140		9.43 707		0.56 293	9.98 433		42
		46		49			4	
19	9.42 186		9.43 756		0.56 244	9.98 429		41
		46		50			3	
20	9.42 232		9.43 806		0.56 194	9.98 426		40
		46		49			4	
21	9.42 278		9.43 855		0.56 145	9.98 422		39
		46		50			3	
22	9.42 324		9.43 905		0.56 095	9.98 419		38
		46		49			4	
23	9.42 370		9.43 954		0.56 046	9.98 415		37
		46		50			3	
24	9.42 416		9.44 004		0.55 996	9.98 412		36
		45		49			3	
25	9.42 461		9.44 053		0.55 947	9.98 409		35
		46		49			4	
26	9.42 507		9.44 102		0.55 898	9.98 405		34
		46		49			3	
27	9.42 553		9.44 151		0.55 849	9.98 402		33
		46		50			4	
28	9.42 599		9.44 201		0.55 799	9.98 398		32
		45		49			3	
29	9.42 644		9.44 250		0.55 750	9.98 395		31
		46		49			4	
30	9.42 690		9.44 299		0.55 701	9.98 391		30
		45		49			3	
31	9.42 735		9.44 348		0.55 652	9.98 388		29
		46		49			4	
32	9.42 781		9.44 397		0.55 603	9.98 384		28
		45		49			3	
33	9.42 826		9.44 446		0.55 554	9.98 381		27
		46		49			4	
34	9.42 872		9.44 495		0.55 505	9.98 377		26
		45		49			4	
35	9.42 917		9.44 544		0.55 456	9.98 373		25
		45		48			3	
36	9.42 962		9.44 592		0.55 408	9.98 370		24
		46		49			4	
37	9.43 008		9.44 641		0.55 359	9.98 366		23
		45		49			3	
38	9.43 053		9.44 690		0.55 310	9.98 363		22
		45		48			4	
39	9.43 098		9.44 738		0.55 262	9.98 359		21
		45		49			3	
40	9.43 143		9.44 787		0.55 213	9.98 356		20
		45		48			4	
41	9.43 188		9.44 836		0.55 164	9.98 352		19
		45		49			3	
42	9.43 233		9.44 884		0.55 116	9.98 349		18
		45		48			4	
43	9.43 278		9.44 933		0.55 067	9.98 345		17
		45		48			3	
44	9.43 323		9.44 981		0.55 019	9.98 342		16
		44		48			4	
45	9.43 367		9.45 029		0.54 971	9.98 338		15
		45		48			4	
46	9.43 412		9.45 078		0.54 922	9.98 334		14
		45		48			3	
47	9.43 457		9.45 126		0.54 874	9.98 331		13
		45		48			4	
48	9.43 502		9.45 174		0.54 826	9.98 327		12
		44		49			3	
49	9.43 546		9.45 222		0.54 778	9.98 324		11
		45		48			4	
50	9.43 591		9.45 271		0.54 729	9.98 320		10
		44		48			3	
51	9.43 635		9.45 319		0.54 681	9.98 317		9
		45		48			4	
52	9.43 680		9.45 367		0.54 633	9.98 313		8
		44		48			4	
53	9.43 724		9.45 415		0.54 585	9.98 309		7
		45		48			3	
54	9.43 769		9.45 463		0.54 537	9.98 306		6
		44		48			4	
55	9.43 813		9.45 511		0.54 489	9.98 302		5
		44		48			3	
56	9.43 857		9.45 559		0.54 441	9.98 299		4
		44		47			4	
57	9.43 901		9.45 606		0.54 394	9.98 295		3
		45		48			4	
58	9.43 946		9.45 654		0.54 346	9.98 291		2
		44		48			3	
59	9.43 990		9.45 702		0.54 298	9.98 288		1
		44						
60	9.44 034		9.45 750		0.54 250	9.98 284		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

P P			
	51	50	49
1	0.8	0.8	0.8
2	1.7	1.7	1.6
3	2.6	2.5	2.4
4	3.4	3.3	3.3
5	4.2	4.2	4.1
6	5.1	5.0	4.9
7	6.0	5.8	5.7
8	6.8	6.7	6.5
9	7.6	7.5	7.4
10	8.5	8.3	8.2
20	17.0	16.7	16.3
30	25.5	25.0	24.5
40	34.0	33.3	32.7
50	42.5	41.7	40.8

	48	47	46
1	0.8	0.8	0.8
2	1.6	1.6	1.5
3	2.4	2.4	2.3
4	3.2	3.1	3.1
5	4.0	3.9	3.8
6	4.8	4.7	4.6
7	5.6	5.5	5.4
8	6.4	6.3	6.1
9	7.2	7.0	6.9
10	8.0	7.8	7.7
20	16.0	15.7	15.3
30	24.0	23.5	23.0
40	32.0	31.3	30.7
50	40.0	39.2	38.3

	45	44	4	3
1	0.8	0.7	0.1	0.0
2	1.5	1.5	0.1	0.1
3	2.2	2.2	0.2	0.2
4	3.0	2.9	0.3	0.2
5	3.8	3.7	0.3	0.2
6	4.5	4.4	0.4	0.3
7	5.2	5.1	0.5	0.4
8	6.0	5.9	0.5	0.4
9	6.8	6.6	0.6	0.4
10	7.5	7.3	0.7	0.5
20	15.0	14.7	1.3	1.0
30	22.5	22.0	2.0	1.5
40	30.0	29.3	2.7	2.0
50	37.5	36.7	3.3	2.5

	4/50	4/49	4/48	4/47
0	6.2	6.1	6.0	5.9
1	18.8	18.4	18.0	17.6
2	31.2	30.6	30.0	29.4
3	43.8	42.9	42.0	41.1
4				

	3/51	3/50	3/49	3/48
0	8.5	8.3	8.2	8.0
1	25.5	25.0	24.5	24.0
2	42.5	41.7	40.8	40.0
3				

*164° 254° *344° 74°

P P

16°

*106° 196° *286°

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.44 034		9.45 750		0.54 250	9.98 284		60
		44		47			3	
1	9.44 078		9.45 797		0.54 203	9.98 281		59
		44		48			4	
2	9.44 122		9.45 845		0.54 155	9.98 277		58
		44		47			4	
3	9.44 166		9.45 892		0.54 108	9.98 273	3	57
		44		48				
4	9.44 210		9.45 940		0.54 060	9.98 270	4	56
		43		47			4	
5	9.44 253		9.45 987		0.54 013	9.98 266		55
		44		48			4	
6	9.44 297		9.46 035		0.53 965	9.98 262	3	54
		44		47				
7	9.44 341		9.46 082		0.53 918	9.98 259	4	53
		44		48			4	
8	9.44 385		9.46 130		0.53 870	9.98 255		52
		43		47			4	
9	9.44 428		9.46 177		0.53 823	9.98 251	3	51
		44		47				
10	9.44 472		9.46 224		0.53 776	9.98 248	4	50
		44		47			4	
11	9.44 516		9.46 271		0.53 729	9.98 244		49
		43		48			4	
12	9.44 559		9.46 319		0.53 681	9.98 240	3	48
		43		47				
13	9.44 602		9.46 366		0.53 634	9.98 237	4	47
		43		47			4	
14	9.44 646		9.46 413		0.53 587	9.98 233		46
		43		47			4	
15	9.44 689		9.46 460		0.53 540	9.98 229	3	45
		44		47				
16	9.44 733		9.46 507		0.53 493	9.98 226	4	44
		43		47			4	
17	9.44 776		9.46 554		0.53 446	9.98 222		43
		43		47			4	
18	9.44 819		9.46 601		0.53 399	9.98 218	3	42
		43		47				
19	9.44 862		9.46 648		0.53 352	9.98 215	4	41
		43		46			4	
20	9.44 905		9.46 694		0.53 306	9.98 211		40
		43		47			4	
21	9.44 948		9.46 741		0.53 259	9.98 207		39
		44		47			3	
22	9.44 992		9.46 788		0.53 212	9.98 204		38
		43		47			4	
23	9.45 035		9.46 835		0.53 165	9.98 200		37
		42		46			4	
24	9.45 077		9.46 881		0.53 119	9.98 196		36
		43		47			4	
25	9.45 120		9.46 928		0.53 072	9.98 192		35
		43		47			3	
26	9.45 163		9.46 975		0.53 025	9.98 189		34
		43		46			4	
27	9.45 206		9.47 021		0.52 979	9.98 185		33
		43		47			4	
28	9.45 249		9.47 068		0.52 932	9.98 181		32
		43		46			4	
29	9.45 292		9.47 114		0.52 886	9.98 177		31
		42		46			3	
30	9.45 334		9.47 160		0.52 840	9.98 174		30
		43		47			4	
31	9.45 377		9.47 207		0.52 793	9.98 170		29
		42		46			4	
32	9.45 419		9.47 253		0.52 747	9.98 166		28
		43		46			4	
33	9.45 462		9.47 299		0.52 701	9.98 162		27
		42		47			3	
34	9.45 504		9.47 346		0.52 654	9.98 159		26
		43		46			4	
35	9.45 547		9.47 392		0.52 608	9.98 155		25
		42		46			4	
36	9.45 589		9.47 438		0.52 562	9.98 151		24
		43		46			4	
37	9.45 632		9.47 484		0.52 516	9.98 147		23
		42		46			3	
38	9.45 674		9.47 530		0.52 470	9.98 144		22
		42		46			4	
39	9.45 716		9.47 576		0.52 424	9.98 140		21
		42		46			4	
40	9.45 758		9.47 622		0.52 378	9.98 136		20
		43		46			4	
41	9.45 801		9.47 668		0.52 332	9.98 132		19
		42		46			3	
42	9.45 843		9.47 714		0.52 286	9.98 129		18
		42		46			4	
43	9.45 885		9.47 760		0.52 240	9.98 125		17
		42		46			4	
44	9.45 927		9.47 806		0.52 194	9.98 121		16
		42		46			4	
45	9.45 969		9.47 852		0.52 148	9.98 117		15
		42		45			4	
46	9.46 011		9.47 897		0.52 103	9.98 113		14
		42		46			3	
47	9.46 053		9.47 943		0.52 057	9.98 110		13
		42		46			4	
48	9.46 095		9.47 989		0.52 011	9.98 106		12
		41		46			4	
49	9.46 136		9.48 035		0.51 965	9.98 102		11
		42		45			4	
50	9.46 178		9.48 080		0.51 920	9.98 098		10
		42		46			4	
51	9.46 220		9.48 126		0.51 874	9.98 094		9
		42		45			4	
52	9.46 262		9.48 171		0.51 829	9.98 090		8
		41		46			3	
53	9.46 303		9.48 217		0.51 783	9.98 087		7
		42		45			4	
54	9.46 345		9.48 262		0.51 738	9.98 083		6
		41		45			4	
55	9.46 386		9.48 307		0.51 693	9.98 079		5
		42		46			4	
56	9.46 428		9.48 353		0.51 647	9.98 075		4
		41		45			4	
57	9.46 469		9.48 398		0.51 602	9.98 071		3
		42		45			4	
58	9.46 511		9.48 443		0.51 557	9.98 067		2
		41		46			4	
59	9.46 552		9.48 489		0.51 511	9.98 063		1
		42		45			3	
60	9.46 594		9.48 534		0.51 466	9.98 060		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

P	P		
	48	47	46
1	0 8	0.8	0.8
2	1.6	1.6	1.5
3	2.4	2.4	2.3
4	3.2	3.1	3.1
5	4.0	3.9	3.8
6	4.8	4.7	4.6
7	5.6	5.5	5.4
8	6.4	6.3	6.1
9	7.2	7.0	6.9
10	8.0	7.8	7.7
20	16.0	15.7	15.3
30	24.0	23.5	23.0
40	32.0	31.3	30.7
50	40.0	39.2	38.3

	45	44	43
1	0.8	0.7	0.7
2	1.5	1.5	1.4
3	2.2	2.2	2.2
4	3.0	2.9	2.9
5	3.8	3.7	3.6
6	4.5	4.4	4.3
7	5.2	5.1	5.0
8	6.0	5.9	5.7
9	6.8	6.6	6.4
10	7.5	7.3	7.2
20	15.0	14.7	14.3
30	22.5	22.0	21.5
40	30.0	29.3	28.7
50	37.5	36.7	35.8

	42	41	4	3
1	0.7	0.7	0.1	0.0
2	1.4	1.4	0.1	0.1
3	2.1	2.0	0.2	0.2
4	2.8	2.7	0.3	0.2
5	3.5	3.4	0.3	0.2
6	4.2	4.1	0.4	0.3
7	4.9	4.8	0.5	0.4
8	5.6	5.5	0.5	0.4
9	6.3	6.2	0.6	0.4
10	7.0	6.8	0.7	0.5
20	14.0	13.7	1.3	1.0
30	21.0	20.5	2.0	1.5
40	28.0	27.3	2.7	2.0
50	35.0	34.2	3.3	2.5

	$\frac{4}{48}$	$\frac{4}{47}$	$\frac{4}{46}$	$\frac{4}{45}$
0				
1	6.0	5.9	5.8	5.6
2	18.0	17.6	17.2	16.9
3	30.0	29.4	28.8	28.1
4	42.0	41.1	40.2	39.4

	$\frac{3}{48}$	$\frac{3}{47}$	$\frac{3}{46}$	$\frac{3}{45}$
0				
1	8.0	7.8	7.7	7.5
2	24.0	23.5	23.0	22.5
3	40.0	39.2	38.3	37.5

P	P

*163° 253° *343°

73°

17°

*107° 197° *287°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d		P	P	
0	9.46 594		9.48 534		0.51 466	9.98 060		60		45	44	43
		41		45			4		1	0.8	0.7	0.7
1	9.46 635		9.48 579		0.51 421	9.98 056		59	2	1.5	1.5	1.4
2	9.46 676	41	9.48 624	45	0.51 376	9.98 052	4	58	3	2.2	2.2	2.2
3	9.46 717	41	9.48 669	45	0.51 331	9.98 048	4	57	4	3.0	2.9	2.9
4	9.46 758	41	9.48 714	45	0.51 286	9.98 044	4	56	5	3.8	3.7	3.6
5	9.46 800	42	9.48 759	45	0.51 241	9.98 040	4	55	6	4.5	4.4	4.3
6	9.46 841	41	9.48 804	45	0.51 196	9.98 036	4	54	7	5.2	5.1	5.0
7	9.46 882	41	9.48 849	45	0.51 151	9.98 032	3	53	8	6.0	5.9	5.7
8	9.46 923	41	9.48 894	45	0.51 106	9.98 029	4	52	9	6.8	6.6	6.4
9	9.46 964	41	9.48 939	45	0.51 061	9.98 025	4	51				
10	9.47 005	40	9.48 984	45	0.51 016	9.98 021	4	50	10	7.5	7.3	7.2
11	9.47 045	41	9.49 029	44	0.50 971	9.98 017	4	49	20	15.0	14.7	14.3
12	9.47 086	41	9.49 073	45	0.50 927	9.98 013	4	48	30	22.5	22.0	21.5
13	9.47 127	41	9.49 118	45	0.50 882	9.98 009	4	47	40	30.0	29.3	28.7
14	9.47 168	41	9.49 163	44	0.50 837	9.98 005	4	46	50	37.5	36.7	35.8
15	9.47 209	40	9.49 207	45	0.50 793	9.98 001	4	45				
16	9.47 249	41	9.49 252	44	0.50 748	9.97 997	4	44		42	41	40
17	9.47 290	40	9.49 296	45	0.50 704	9.97 993	4	43	1	0.7	0.7	0.7
18	9.47 330	41	9.49 341	44	0.50 659	9.97 989	4	42	2	1.4	1.4	1.3
19	9.47 371	40	9.49 385	45	0.50 615	9.97 986	3	41	3	2.1	2.0	2.0
20	9.47 411	41	9.49 430	44	0.50 570	9.97 982	4	40	4	2.8	2.7	2.7
21	9.47 452	40	9.49 474	44	0.50 526	9.97 978	4	39	5	3.5	3.4	3.3
22	9.47 492	41	9.49 519	44	0.50 481	9.97 974	4	38	6	4.2	4.1	4.0
23	9.47 533	40	9.49 563	44	0.50 437	9.97 970	4	37	7	4.9	4.8	4.7
24	9.47 573	40	9.49 607	45	0.50 393	9.97 966	4	36	8	5.6	5.5	5.3
25	9.47 613	40	9.49 652	44	0.50 348	9.97 962	4	35	9	6.3	6.2	6.0
26	9.47 654	41	9.49 696	44	0.50 304	9.97 958	4	34	10	7.0	6.8	6.7
27	9.47 694	40	9.49 740	44	0.50 260	9.97 954	4	33	20	14.0	13.7	13.3
28	9.47 734	40	9.49 784	44	0.50 216	9.97 950	4	32	30	21.0	20.5	20.0
29	9.47 774	40	9.49 828	44	0.50 172	9.97 946	4	31	40	28.0	27.3	26.7
30	9.47 814	40	9.49 872	44	0.50 128	9.97 942	4	30	50	35.0	34.2	33.3
31	9.47 854	40	9.49 916	44	0.50 084	9.97 938	4	29		39	5	4	3
32	9.47 894	40	9.49 960	44	0.50 040	9.97 934	4	28	1	0.6	0.1	0.1	0.0
33	9.47 934	40	9.50 004	44	0.49 996	9.97 930	4	27	2	1.3	0.2	0.1	0.1
34	9.47 974	40	9.50 048	44	0.49 952	9.97 926	4	26	3	2.0	0.2	0.2	0.2
35	9.48 014	40	9.50 092	44	0.49 908	9.97 922	4	25	4	2.6	0.3	0.3	0.2
36	9.48 054	40	9.50 136	44	0.49 864	9.97 918	4	24	5	3.2	0.4	0.3	0.2
37	9.48 094	40	9.50 180	44	0.49 820	9.97 914	4	23	6	3.9	0.5	0.4	0.3
38	9.48 133	39	9.50 223	43	0.49 777	9.97 910	4	22	7	4.6	0.6	0.5	0.4
39	9.48 173	40	9.50 267	44	0.49 733	9.97 906	4	21	8	5.2	0.7	0.5	0.4
40	9.48 213	40	9.50 311	44	0.49 689	9.97 902	4	20	9	5.8	0.8	0.6	0.4
41	9.48 252	39	9.50 355	44	0.49 645	9.97 898	4	19	10	6.5	0.8	0.7	0.5
42	9.48 292	40	9.50 398	43	0.49 602	9.97 894	4	18	20	13.0	1.7	1.3	1.0
43	9.48 332	40	9.50 442	44	0.49 558	9.97 890	4	17	30	19.5	2.5	2.0	1.5
44	9.48 371	39	9.50 485	43	0.49 515	9.97 886	4	16	40	26.0	3.3	2.7	2.0
45	9.48 411	40	9.50 529	44	0.49 471	9.97 882	4	15	50	32.5	4.2	3.3	2.5
46	9.48 450	39	9.50 572	43	0.49 428	9.97 878	4	14					
47	9.48 490	40	9.50 616	44	0.49 384	9.97 874	4	13		5	4	4	
48	9.48 529	39	9.50 659	43	0.49 341	9.97 870	4	12		43	45	44	
49	9.48 568	39	9.50 703	44	0.49 297	9.97 866	4	11	0				
50	9.48 607	39	9.50 746	43	0.49 254	9.97 861	5	10	1	4.3	5.6	5.5	
51	9.48 647	40	9.50 789	43	0.49 211	9.97 857	4	9	2	12.9	16.9	16.5	
52	9.48 686	39	9.50 833	44	0.49 167	9.97 853	4	8	3	21.5	28.1	27.5	
53	9.48 725	39	9.50 876	43	0.49 124	9.97 849	4	7	4	30.1	39.4	38.5	
54	9.48 764	39	9.50 919	43	0.49 081	9.97 845	4	6	5	38.7	—	—	
55	9.48 803	39	9.50 962	43	0.49 038	9.97 841	4	5					
56	9.48 842	39	9.51 005	43	0.48 995	9.97 837	4	4		4	3	3	
57	9.48 881	39	9.51 048	43	0.48 952	9.97 833	4	3	0				
58	9.48 920	39	9.51 092	44	0.48 908	9.97 829	4	2	1	5.4	7.5	7.3	
59	9.48 959	39	9.51 135	43	0.48 865	9.97 825	4	1	2	16.1	22.5	22.0	
60	9.48 998		9.51 178		0.48 822	9.97 821	4	0	3	26.9	37.5	36.7	
									4	37.6	—	—	
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′		P	P	

*162° 252° *342°

72°

18°

*108° 198° *288°

	L Sin	d	L Tan	c d	L Cot	L Cos	d		P P
0	9.48 998		9.51 178	43	0.48 822	9.97 821	4	60	
1	9.49 037	39	9.51 221	43	0.48 779	9.97 817	5	59	43 42 41
2	9.49 076	39	9.51 264	42	0.48 736	9.97 812	4	58	1 0.7 0.7 0.7
3	9.49 115	39	9.51 306	43	0.48 694	9.97 808	4	57	2 1.4 1.4 1.4
4	9.49 153	38	9.51 349	43	0.48 651	9.97 804	4	56	3 2.2 2.1 2.0
5	9.49 192	39	9.51 392	43	0.48 608	9.97 800	4	55	4 2.9 2.8 2.7
6	9.49 231	39	9.51 435	43	0.48 565	9.97 796	4	54	5 3.6 3.5 3.4
7	9.49 269	38	9.51 478	42	0.48 522	9.97 792	4	53	6 4.3 4.2 4.1
8	9.49 308	39	9.51 520	43	0.48 480	9.97 788	4	52	7 5.0 4.9 4.8
9	9.49 347	39	9.51 563	43	0.48 437	9.97 784	4	51	8 5.7 5.6 5.5
10	9.49 385	38	9.51 606	42	0.48 394	9.97 779	5	50	9 6.4 6.3 6.2
11	9.49 424	39	9.51 648	43	0.48 352	9.97 775	4	49	10 7.2 7.0 6.8
12	9.49 462	38	9.51 691	43	0.48 309	9.97 771	4	48	20 14.3 14.0 13.7
13	9.49 500	38	9.51 734	42	0.48 266	9.97 767	4	47	30 21.5 21.0 20.5
14	9.49 539	39	9.51 776	43	0.48 224	9.97 763	4	46	40 28.7 28.0 27.3
15	9.49 577	38	9.51 819	42	0.48 181	9.97 759	4	45	50 35.8 35.0 34.2
16	9.49 615	38	9.51 861	42	0.48 139	9.97 754	5	44	39 38 37
17	9.49 654	39	9.51 903	43	0.48 097	9.97 750	4	43	1 0.6 0.6 0.6
18	9.49 692	38	9.51 946	42	0.48 054	9.97 746	4	42	2 1.3 1.3 1.2
19	9.49 730	38	9.51 988	43	0.48 012	9.97 742	4	41	3 2.0 1.9 1.8
20	9.49 768	38	9.52 031	42	0.47 969	9.97 738	4	40	4 2.6 2.5 2.5
21	9.49 806	38	9.52 073	42	0.47 927	9.97 734	4	39	5 3.2 3.2 3.1
22	9.49 844	38	9.52 115	42	0.47 885	9.97 729	5	38	6 3.9 3.8 3.7
23	9.49 882	38	9.52 157	43	0.47 843	9.97 725	4	37	7 4.6 4.4 4.3
24	9.49 920	38	9.52 200	42	0.47 800	9.97 721	4	36	8 5.2 5.1 4.9
25	9.49 958	38	9.52 242	42	0.47 758	9.97 717	4	35	9 5.8 5.7 5.6
26	9.49 996	38	9.52 284	42	0.47 716	9.97 713	5	34	10 6.5 6.3 6.2
27	9.50 034	38	9.52 326	42	0.47 674	9.97 708	4	33	20 13.0 12.7 12.3
28	9.50 072	38	9.52 368	42	0.47 632	9.97 704	4	32	30 19.5 19.0 18.5
29	9.50 110	38	9.52 410	42	0.47 590	9.97 700	4	31	40 26.0 25.3 24.7
30	9.50 148	37	9.52 452	42	0.47 548	9.97 696	5	30	50 32.5 31.7 30.8
31	9.50 185	38	9.52 494	42	0.47 506	9.97 691	4	29	36 5 4
32	9.50 223	38	9.52 536	42	0.47 464	9.97 687	4	28	1 0.6 0.1 0.1
33	9.50 261	37	9.52 578	42	0.47 422	9.97 683	4	27	2 1.2 0.2 0.1
34	9.50 298	38	9.52 620	41	0.47 380	9.97 679	5	26	3 1.8 0.2 0.2
35	9.50 336	38	9.52 661	42	0.47 339	9.97 674	4	25	4 2.4 0.3 0.3
36	9.50 374	37	9.52 703	42	0.47 297	9.97 670	4	24	5 3.0 0.4 0.3
37	9.50 411	38	9.52 745	42	0.47 255	9.97 666	4	23	6 3.6 0.5 0.4
38	9.50 449	37	9.52 787	42	0.47 213	9.97 662	5	22	7 4.2 0.6 0.5
39	9.50 486	37	9.52 829	41	0.47 171	9.97 657	4	21	8 4.8 0.7 0.5
40	9.50 523	38	9.52 870	42	0.47 130	9.97 653	4	20	9 5.4 0.8 0.6
41	9.50 561	37	9.52 912	41	0.47 088	9.97 649	4	19	10 6.0 0.8 0.7
42	9.50 598	37	9.52 953	42	0.47 047	9.97 645	4	18	20 12.0 1.7 1.3
43	9.50 635	37	9.52 995	42	0.47 005	9.97 640	5	17	30 18.0 2.5 2.0
44	9.50 673	38	9.53 037	41	0.46 963	9.97 636	4	16	40 24.0 3.3 2.7
45	9.50 710	37	9.53 078	42	0.46 922	9.97 632	4	15	50 30.0 4.2 3.3
46	9.50 747	37	9.53 120	41	0.46 880	9.97 628	4	14	
47	9.50 784	37	9.53 161	41	0.46 839	9.97 623	5	13	5 5 5
48	9.50 821	37	9.53 202	42	0.46 798	9.97 619	4	12	43 42 41
49	9.50 858	37	9.53 244	41	0.46 756	9.97 615	4	11	0 4.3 4.2 4.1
50	9.50 896	38	9.53 285	42	0.46 715	9.97 610	5	10	1 12.9 12.6 12.3
51	9.50 933	37	9.53 327	41	0.46 673	9.97 606	4	9	2 21.5 21.0 20.5
52	9.50 970	37	9.53 368	41	0.46 632	9.97 602	4	8	3 30.1 29.4 28.7
53	9.51 007	37	9.53 409	41	0.46 591	9.97 597	5	7	4 38.7 37.8 36.9
54	9.51 043	36	9.53 450	42	0.46 550	9.97 593	4	6	
55	9.51 080	37	9.53 492	41	0.46 508	9.97 589	4	5	4 4 4
56	9.51 117	37	9.53 533	41	0.46 467	9.97 584	5	4	43 42 41
57	9.51 154	37	9.53 574	41	0.46 426	9.97 580	4	3	0 5.4 5.2 5.1
58	9.51 191	37	9.53 615	41	0.46 385	9.97 576	4	2	1 16.1 15.8 15.4
59	9.51 227	36	9.53 656	41	0.46 344	9.97 571	5	1	2 26.9 26.2 25.6
60	9.51 264	37	9.53 697		0.46 303	9.97 567	4	0	3 37.6 36.8 35.9
	L Cos	d	L Cot	c d	L Tan	L Sin	d		P P

*161° 251° *341°

19°

*109° 199° *289°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.51 264		9.53 697		0.46 303	9.97 567		60
1	9.51 301	37	9.53 738	41	0.46 262	9.97 563	4	59
2	9.51 338	37	9.53 779	41	0.46 221	9.97 558	5	58
3	9.51 374	36	9.53 820	41	0.46 180	9.97 554	4	57
4	9.51 411	37	9.53 861	41	0.46 139	9.97 550	4	56
5	9.51 447	36	9.53 902	41	0.46 098	9.97 545	5	55
6	9.51 484	37	9.53 943	41	0.46 057	9.97 541	4	54
7	9.51 520	36	9.53 984	41	0.46 016	9.97 536	5	53
8	9.51 557	37	9.54 025	41	0.45 975	9.97 532	4	52
9	9.51 593	36	9.54 065	40	0.45 935	9.97 528	4	51
10	9.51 629	36	9.54 106	41	0.45 894	9.97 523	5	50
11	9.51 666	37	9.54 147	41	0.45 853	9.97 519	4	49
12	9.51 702	36	9.54 187	40	0.45 813	9.97 515	4	48
13	9.51 738	36	9.54 228	41	0.45 772	9.97 510	5	47
14	9.51 774	36	9.54 269	41	0.45 731	9.97 506	4	46
15	9.51 811	37	9.54 309	40	0.45 691	9.97 501	5	45
16	9.51 847	36	9.54 350	41	0.45 650	9.97 497	4	44
17	9.51 883	36	9.54 390	40	0.45 610	9.97 492	5	43
18	9.51 919	36	9.54 431	41	0.45 569	9.97 488	4	42
19	9.51 955	36	9.54 471	40	0.45 529	9.97 484	4	41
20	9.51 991	36	9.54 512	41	0.45 488	9.97 479	5	40
21	9.52 027	36	9.54 552	40	0.45 448	9.97 475	4	39
22	9.52 063	36	9.54 593	41	0.45 407	9.97 470	5	38
23	9.52 099	36	9.54 633	40	0.45 367	9.97 466	4	37
24	9.52 135	36	9.54 673	40	0.45 327	9.97 461	5	36
25	9.52 171	36	9.54 714	41	0.45 286	9.97 457	4	35
26	9.52 207	35	9.54 754	40	0.45 246	9.97 453	4	34
27	9.52 242	36	9.54 794	40	0.45 206	9.97 448	5	33
28	9.52 278	36	9.54 835	41	0.45 165	9.97 444	4	32
29	9.52 314	36	9.54 875	40	0.45 125	9.97 439	5	31
30	9.52 350	35	9.54 915	40	0.45 085	9.97 435	4	30
31	9.52 385	36	9.54 955	40	0.45 045	9.97 430	5	29
32	9.52 421	35	9.54 995	40	0.45 005	9.97 426	4	28
33	9.52 456	36	9.55 035	40	0.44 965	9.97 421	5	27
34	9.52 492	35	9.55 075	40	0.44 925	9.97 417	4	26
35	9.52 527	36	9.55 115	40	0.44 885	9.97 412	5	25
36	9.52 563	35	9.55 155	40	0.44 845	9.97 408	4	24
37	9.52 598	36	9.55 195	40	0.44 805	9.97 403	5	23
38	9.52 634	35	9.55 235	40	0.44 765	9.97 399	4	22
39	9.52 669	36	9.55 275	40	0.44 725	9.97 394	5	21
40	9.52 705	35	9.55 315	40	0.44 685	9.97 390	4	20
41	9.52 740	35	9.55 355	40	0.44 645	9.97 385	5	19
42	9.52 775	35	9.55 395	40	0.44 605	9.97 381	4	18
43	9.52 811	36	9.55 434	39	0.44 566	9.97 376	5	17
44	9.52 846	35	9.55 474	40	0.44 526	9.97 372	4	16
45	9.52 881	35	9.55 514	40	0.44 486	9.97 367	5	15
46	9.52 916	35	9.55 554	39	0.44 446	9.97 363	4	14
47	9.52 951	35	9.55 593	40	0.44 407	9.97 358	5	13
48	9.52 986	35	9.55 633	40	0.44 367	9.97 353	4	12
49	9.53 021	35	9.55 673	39	0.44 327	9.97 349	5	11
50	9.53 056	36	9.55 712	40	0.44 288	9.97 344	4	10
51	9.53 092	34	9.55 752	39	0.44 248	9.97 340	5	9
52	9.53 126	35	9.55 791	40	0.44 209	9.97 335	4	8
53	9.53 161	35	9.55 831	39	0.44 169	9.97 331	5	7
54	9.53 196	35	9.55 870	40	0.44 130	9.97 326	4	6
55	9.53 231	35	9.55 910	39	0.44 090	9.97 322	5	5
56	9.53 266	35	9.55 949	40	0.44 051	9.97 317	5	4
57	9.53 301	35	9.55 989	39	0.44 011	9.97 312	4	3
58	9.53 336	34	9.56 028	39	0.43 972	9.97 308	5	2
59	9.53 370	35	9.56 067	40	0.43 933	9.97 303	4	1
60	9.53 405		9.56 107		0.43 893	9.97 299		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

*160° 250° *340°

70°

P P

	41	40	39
1	0.7	0.7	0.6
2	1.4	1.3	1.3
3	2.0	2.0	2.0
4	2.7	2.7	2.6
5	3.4	3.3	3.2
6	4.1	4.0	3.9
7	4.8	4.7	4.6
8	5.5	5.3	5.2
9	6.2	6.0	5.8
10	6.8	6.7	6.5
20	13.7	13.3	13.0
30	20.5	20.0	19.5
40	27.3	26.7	26.0
50	34.2	33.3	32.5

	37	36	35
1	0.6	0.6	0.6
2	1.2	1.2	1.2
3	1.8	1.8	1.8
4	2.5	2.4	2.3
5	3.1	3.0	2.9
6	3.7	3.6	3.5
7	4.3	4.2	4.1
8	4.9	4.8	4.7
9	5.6	5.4	5.2
10	6.2	6.0	5.8
20	12.3	12.0	11.7
30	18.5	18.0	17.5
40	24.7	24.0	23.3
50	30.8	30.0	29.2

	34	5	4
1	0.6	0.1	0.1
2	1.1	0.2	0.1
3	1.7	0.2	0.2
4	2.3	0.3	0.3
5	2.8	0.4	0.3
6	3.4	0.5	0.4
7	4.0	0.6	0.5
8	4.5	0.7	0.5
9	5.1	0.8	0.6
10	5.7	0.8	0.7
20	11.3	1.7	1.3
30	17.0	2.5	2.0
40	22.7	3.3	2.7
50	28.3	4.2	3.3

	5/41	5/40	5/39
0			
1	4.1	4.0	3.9
2	12.3	12.0	11.7
3	20.5	20.0	19.5
4	28.7	28.0	27.3
5	36.9	36.0	35.1

	4/41	4/40	4/39
0			
1	5.1	5.0	4.9
2	15.4	15.0	14.6
3	25.6	25.0	24.4
4	35.9	35.0	34.1

P P

20°

*110° 200° *290°

	L Sin	d	L Tan	c d	L Cot	L Cos	d		P	P	
0	9.53 405		9.56 107		0.43 893	9.97 299		60		40	39	38
		35		39			5		1	0 7	0.6	0.6
1	9.53 440		9.56 146		0.43 854	9.97 294		59	2	1.3	1.3	1.3
2	9.53 475	35	9.56 185	39	0.43 815	9.97 289	5	58	3	2.0	2.0	1.9
3	9.53 509	34	9.56 224	39	0.43 776	9.97 285	4	57	4	2.7	2.6	2.5
		35		40			5					
4	9.53 544		9.56 264		0.43 736	9.97 280	4	56	5	3.3	3.2	3.2
5	9.53 578	34	9.56 303	39	0.43 697	9.97 276	5	55	6	4.0	3.9	3.8
6	9.53 613	35	9.56 342	39	0.43 658	9.97 271	5	54	7	4.7	4.6	4.4
		34		39			5		8	5.3	5.2	5.1
7	9.53 647		9.56 381		0.43 619	9.97 266	4	53	9	6.0	5.8	5.7
8	9.53 682	35	9.56 420	39	0.43 580	9.97 262	5	52				
9	9.53 716	34	9.56 459	39	0.43 541	9.97 257	5	51	10	6.7	6.5	6.3
10	9.53 751	35	9.56 498	39	0.43 502	9.97 252	4	50	20	13.3	13.0	12.7
11	9.53 785	34	9.56 537	39	0.43 463	9.97 248	5	49	30	20.0	19.5	19.0
12	9.53 819	34	9.56 576	39	0.43 424	9.97 243	5	48	40	26.7	26.0	25.3
13	9.53 854	35	9.56 615	39	0.43 385	9.97 238	5	47	50	33.3	32.5	31.7
		34		39			4					
14	9.53 888		9.56 654		0.43 346	9.97 234	5	46		37	35	34
15	9.53 922	34	9.56 693	39	0.43 307	9.97 229	5	45	1	0.6	0.6	0.6
16	9.53 957	35	9.56 732	39	0.43 268	9.97 224	5	44	2	1.2	1.2	1.1
		34		39			4					
17	9.53 991		9.56 771		0.43 229	9.97 220	5	43	3	1.8	1.8	1.7
18	9.54 025	34	9.56 810	39	0.43 190	9.97 215	5	42	4	2.5	2.3	2.3
19	9.54 059	34	9.56 849	39	0.43 151	9.97 210	4	41				
20	9.54 093	34	9.56 887	38	0.43 113	9.97 206	5	40	5	3.1	2.9	2.8
		34		39			5		6	3.7	3.5	3.4
21	9.54 127		9.56 926		0.43 074	9.97 201		39	7	4.3	4.1	4.0
22	9.54 161	34	9.56 965	39	0.43 035	9.97 196	5	38	8	4.9	4.7	4.5
23	9.54 195	34	9.57 004	39	0.42 996	9.97 192	4	37	9	5.6	5.2	5.1
		34		38			5					
24	9.54 229		9.57 042		0.42 958	9.97 187	5	36	10	6.2	5.8	5.7
25	9.54 263	34	9.57 081	39	0.42 919	9.97 182	5	35	20	12.3	11.7	11.3
26	9.54 297	34	9.57 120	39	0.42 880	9.97 178	4	34	30	18.5	17.5	17.0
		34		38			5					
27	9.54 331		9.57 158		0.42 842	9.97 173	5	33	40	24.7	23.3	22.7
28	9.54 365	34	9.57 197	39	0.42 803	9.97 168	5	32	50	30.8	29.2	28.3
29	9.54 399	34	9.57 235	38	0.42 765	9.97 163	5	31				
		34		39			4			33	5	4
30	9.54 433		9.57 274	38	0.42 726	9.97 159		30	1	0.6	0.1	0.1
31	9.54 466	33	9.57 312		0.42 688	9.97 154	5	29	2	1.1	0.2	0.1
32	9.54 500	34	9.57 351	39	0.42 649	9.97 149	5	28	3	1.6	0.2	0.2
33	9.54 534	34	9.57 389	38	0.42 611	9.97 145	4	27	4	2.2	0.3	0.3
		33		39			5					
34	9.54 567		9.57 428		0.42 572	9.97 140	5	26	5	2.8	0.4	0.3
35	9.54 601	34	9.57 466	38	0.42 534	9.97 135	5	25	6	3.3	0.5	0.4
36	9.54 635	34	9.57 504	38	0.42 496	9.97 130	5	24	7	3.8	0.6	0.5
		33		39			4		8	4.4	0.7	0.5
37	9.54 668		9.57 543		0.42 457	9.97 126	5	23	9	5.0	0.8	0.6
38	9.54 702	34	9.57 581	38	0.42 419	9.97 121	5	22				
39	9.54 735	33	9.57 619	38	0.42 381	9.97 116	5	21	10	5.5	0.8	0.7
		33		39			5		20	11.0	1.7	1.3
40	9.54 769	34	9.57 658	38	0.42 342	9.97 111	4	20	30	16.5	2.5	2.0
41	9.54 802	33	9.57 696	38	0.42 304	9.97 107	5	19	40	22.0	3.3	2.7
42	9.54 836	34	9.57 734	38	0.42 266	9.97 102	5	18	50	27.5	4.2	3.3
43	9.54 869	33	9.57 772	38	0.42 228	9.97 097	5	17				
		34		38			5			5	5	5
44	9.54 903		9.57 810		0.42 190	9.97 092	5	16		—	—	—
45	9.54 936	33	9.57 849	39	0.42 151	9.97 087	5	15		40	39	38
46	9.54 969	33	9.57 887	38	0.42 113	9.97 083	4	14				
		34		38			5		0	4.0	3.9	3.8
47	9.55 003		9.57 925		0.42 075	9.97 078	5	13	1	12.0	11.7	11.4
48	9.55 036	33	9.57 963	38	0.42 037	9.97 073	5	12	2	20.0	19.5	19.0
49	9.55 069	33	9.58 001	38	0.41 999	9.97 068	5	11	3	28.0	27.3	26.6
		33		38			5		4	36.0	35.1	34.2
50	9.55 102		9.58 039	38	0.41 961	9.97 063	4	10	5			
51	9.55 136	34	9.58 077		0.41 923	9.97 059	5	9		5	4	4
52	9.55 169	33	9.58 115	38	0.41 885	9.97 054	5	8		—	—	—
53	9.55 202	33	9.58 153	38	0.41 847	9.97 049	5	7		37	39	38
		33		38			6		0	3.7	4.9	4.8
54	9.55 235		9.58 191		0.41 809	9.97 044	5	6	1	11.1	14.6	14.2
55	9.55 268	33	9.58 229	38	0.41 771	9.97 039	4	5	2	18.5	24.4	23.8
56	9.55 301	33	9.58 267	38	0.41 733	9.97 035	5	4	3	25.9	34.1	33.2
		33		37			5		4	33.3	—	—
57	9.55 334		9.58 304		0.41 696	9.97 030	5	3	5			
58	9.55 367	33	9.58 342	38	0.41 658	9.97 025	5	2				
59	9.55 400	33	9.58 380	38	0.41 620	9.97 020	5	1				
60	9.55 433	33	9.58 418	38	0.41 582	9.97 015	5	0				
	L Cos	d	L Cot	c d	L Tan	L Sin	d		P	P		

*159° 249° *339°

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*111° 201° *291°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d		P P
0	9.55 433		9.58 418		0.41 582	9.97 015		60	38 37 36
1	9.55 466	33	9.58 455	37	0.41 545	9.97 010	5	59	1 0.6 0.6 0.6
2	9.55 499	33	9.58 493	38	0.41 507	9.97 005	5	58	2 1.3 1.2 1.2
3	9.55 532	33	9.58 531	38	0.41 469	9.97 001	4	57	3 1.9 1.8 1.8
4	9.55 564	32	9.58 569		0.41 431	9.96 996	5	56	4 2.5 2.5 2.4
5	9.55 597	33	9.58 606	37	0.41 394	9.96 991	5	55	5 3.2 3.1 3.0
6	9.55 630	33	9.58 644	38	0.41 356	9.96 986	5	54	6 3.8 3.7 3.6
7	9.55 663	33	9.58 681	37	0.41 319	9.96 981	5	53	7 4.4 4.3 4.2
8	9.55 695	32	9.58 719	38	0.41 281	9.96 976	5	52	8 5.1 4.9 4.8
9	9.55 728	33	9.58 757	38	0.41 243	9.96 971	5	51	9 5.7 5.6 5.4
10	9.55 761	33	9.58 794	37	0.41 206	9.96 966	5	50	10 6.3 6.2 6.0
11	9.55 793	32	9.58 832	38	0.41 168	9.96 962	4		20 12.7 12.3 12.0
12	9.55 826	33	9.58 869	37	0.41 131	9.96 957	5	49	30 19.0 18.5 18.0
13	9.55 858	32	9.58 907	38	0.41 093	9.96 952	5	48	40 25.3 24.7 24.0
14	9.55 891	33	9.58 944	37	0.41 056	9.96 947	5	47	50 31.7 30.8 30.0
15	9.55 923	32	9.58 981	37	0.41 019	9.96 942	5	46	33 32 31
16	9.55 956	33	9.59 019	38	0.40 981	9.96 937	5	45	1 0.6 0.5 0.5
17	9.55 988	32	9.59 056	37	0.40 944	9.96 932	5	44	2 1.1 1.1 1.0
18	9.56 021	33	9.59 094	38	0.40 906	9.96 927	5	43	3 1.6 1.6 1.6
19	9.56 053	32	9.59 131	37	0.40 869	9.96 922	5	42	4 2.2 2.1 2.1
20	9.56 085	32	9.59 168	37	0.40 832	9.96 917	5	41	5 2.8 2.7 2.6
21	9.56 118	33	9.59 205	37	0.40 795	9.96 912	5	40	6 3.3 3.2 3.1
22	9.56 150	32	9.59 243	38	0.40 757	9.96 907	4	39	7 3.8 3.7 3.6
23	9.56 182	32	9.59 280	37	0.40 720	9.96 903	5	38	8 4.4 4.3 4.1
24	9.56 215	33	9.59 317	37	0.40 683	9.96 898	5	37	9 5.0 4.8 4.6
25	9.56 247	32	9.59 354	37	0.40 646	9.96 893	5	36	10 5.5 5.3 5.2
26	9.56 279	32	9.59 391	37	0.40 609	9.96 888	5	35	20 11.0 10.7 10.3
27	9.56 311	32	9.59 429	38	0.40 571	9.96 883	5	34	30 16.5 16.0 15.5
28	9.56 343	32	9.59 466	37	0.40 534	9.96 878	5	33	40 22.0 21.3 20.7
29	9.56 375	33	9.59 503	37	0.40 497	9.96 873	5	32	50 27.5 26.7 25.8
30	9.56 408	32	9.59 540	37	0.40 460	9.96 868	5	31	6 5 4
31	9.56 440	32	9.59 577	37	0.40 423	9.96 863	5	30	1 0.1 0.1 0.1
32	9.56 472	32	9.59 614	37	0.40 386	9.96 858	5	29	2 0.2 0.2 0.1
33	9.56 504	32	9.59 651	37	0.40 349	9.96 853	5	28	3 0.3 0.2 0.2
34	9.56 536	32	9.59 688	37	0.40 312	9.96 848	5	27	4 0.4 0.3 0.3
35	9.56 568	31	9.59 725	37	0.40 275	9.96 843	5	26	5 0.5 0.4 0.3
36	9.56 599	32	9.59 762	37	0.40 238	9.96 838	5	25	6 0.6 0.5 0.4
37	9.56 631	32	9.59 799	37	0.40 201	9.96 833	5	24	7 0.7 0.6 0.5
38	9.56 663	32	9.59 835	36	0.40 165	9.96 828	5	23	8 0.8 0.7 0.5
39	9.56 695	32	9.59 872	37	0.40 128	9.96 823	5	22	9 0.9 0.8 0.6
40	9.56 727	32	9.59 909	37	0.40 091	9.96 818	5	21	10 1.0 0.8 0.7
41	9.56 759	31	9.59 946	37	0.40 054	9.96 813	5	20	20 2.0 1.7 1.3
42	9.56 790	32	9.59 983	37	0.40 017	9.96 808	5	19	30 3.0 2.5 2.0
43	9.56 822	32	9.60 019	36	0.39 981	9.96 803	5	18	40 4.0 3.3 2.7
44	9.56 854	32	9.60 056	37	0.39 944	9.96 798	5	17	50 5.0 4.2 3.3
45	9.56 886	32	9.60 093	37	0.39 907	9.96 793	5	16	6 5 5
46	9.56 917	31	9.60 130	37	0.39 870	9.96 788	5	15	37 38 37
47	9.56 949	32	9.60 166	36	0.39 834	9.96 783	5	14	0
48	9.56 980	31	9.60 203	37	0.39 797	9.96 778	5	13	1 3.1 3.8 3.7
49	9.57 012	32	9.60 240	37	0.39 760	9.96 772	6	12	2 9.2 11.4 11.1
50	9.57 044	32	9.60 276	36	0.39 724	9.96 767	5	11	3 15.4 19.0 18.5
51	9.57 075	31	9.60 313	37	0.39 687	9.96 762	5	10	4 21.6 26.6 25.9
52	9.57 107	32	9.60 349	36	0.39 651	9.96 757	5	9	5 27.8 34.2 33.3
53	9.57 138	31	9.60 386	37	0.39 614	9.96 752	5	8	6 33.9 — —
54	9.57 169	31	9.60 422	36	0.39 578	9.96 747	5	7	5 4 4
55	9.57 201	32	9.60 459	37	0.39 541	9.96 742	5	6	36 38 37
56	9.57 232	31	9.60 495	36	0.39 505	9.96 737	5	5	0
57	9.57 264	32	9.60 532	37	0.39 468	9.96 732	5	4	1 3.6 4.8 4.6
58	9.57 295	31	9.60 568	36	0.39 432	9.96 727	5	3	2 10.8 14.2 13.9
59	9.57 326	31	9.60 605	37	0.39 395	9.96 722	5	2	3 18.0 23.8 23.1
60	9.57 358	32	9.60 641	36	0.39 359	9.96 717	5	1	4 25.2 33.2 32.4
								0	5 32.4 — —
′	L Cos	d	L Cot	c d	L Tan	L Sin	d		P P

*158° 248° *338°

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*112° 202° *292°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.57 358		9.60 641		0.39 359	9.96 717		60
		31		36			6	
1	9.57 389		9.60 677		0.39 323	9.96 711		59
		31		37			5	
2	9.57 420		9.60 714		0.39 286	9.96 706		58
		31		36			5	
3	9.57 451		9.60 750		0.39 250	9.96 701		57
		31		36			5	
4	9.57 482		9.60 786		0.39 214	9.96 696		56
		32		37			5	
5	9.57 514		9.60 823		0.39 177	9.96 691		55
		31		36			5	
6	9.57 545		9.60 859		0.39 141	9.96 686		54
		31		36			5	
7	9.57 576		9.60 895		0.39 105	9.96 681		53
		31		36			5	
8	9.57 607		9.60 931		0.39 069	9.96 676		52
		31		36			6	
9	9.57 638		9.60 967		0.39 033	9.96 670		51
		31		37			5	
10	9.57 669		9.61 004		0.38 996	9.96 665		50
		31		36			5	
11	9.57 700		9.61 040		0.38 960	9.96 660		49
		31		35			5	
12	9.57 731		9.61 076		0.38 924	9.96 655		48
		31		36			5	
13	9.57 762		9.61 112		0.38 888	9.96 650		47
		31		36			5	
14	9.57 793		9.61 148		0.38 852	9.96 645		46
		31		36			5	
15	9.57 824		9.61 184		0.38 816	9.96 640		45
		31		36			6	
16	9.57 855		9.61 220		0.38 780	9.96 634		44
		30		36			5	
17	9.57 885		9.61 256		0.38 744	9.96 629		43
		31		36			5	
18	9.57 916		9.61 292		0.38 708	9.96 624		42
		31		36			5	
19	9.57 947		9.61 328		0.38 672	9.96 619		41
		31		36			5	
20	9.57 978		9.61 364		0.38 636	9.96 614		40
		30		36			6	
21	9.58 008		9.61 400		0.38 600	9.96 608		39
		31		36			5	
22	9.58 039		9.61 436		0.38 564	9.96 603		38
		31		36			5	
23	9.58 070		9.61 472		0.38 528	9.96 598		37
		31		36			5	
24	9.58 101		9.61 508		0.38 492	9.96 593		36
		30		36			5	
25	9.58 131		9.61 544		0.38 456	9.96 588		35
		31		35			6	
26	9.58 162		9.61 579		0.38 421	9.96 582		34
		30		36			5	
27	9.58 192		9.61 615		0.38 385	9.96 577		33
		31		36			5	
28	9.58 223		9.61 651		0.38 349	9.96 572		32
		30		36			5	
29	9.58 253		9.61 687		0.38 313	9.96 567		31
		31		35			5	
30	9.58 284		9.61 722		0.38 278	9.96 562		30
		30		36			6	
31	9.58 314		9.61 758		0.38 242	9.96 556		29
		31		36			5	
32	9.58 345		9.61 794		0.38 206	9.96 551		28
		30		36			5	
33	9.58 375		9.61 830		0.38 170	9.96 546		27
		31		35			5	
34	9.58 406		9.61 865		0.38 135	9.96 541		26
		30		36			6	
35	9.58 436		9.61 901		0.38 099	9.96 535		25
		30		35			5	
36	9.58 467		9.61 936		0.38 064	9.96 530		24
		30		36			5	
37	9.58 497		9.61 972		0.38 028	9.96 525		23
		30		36			5	
38	9.58 527		9.62 008		0.37 992	9.96 520		22
		30		35			6	
39	9.58 557		9.62 043		0.37 957	9.96 514		21
		31		36			5	
40	9.58 588		9.62 079		0.37 921	9.96 509		20
		30		35			5	
41	9.58 618		9.62 114		0.37 886	9.96 504		19
		30		36			6	
42	9.58 648		9.62 150		0.37 850	9.96 498		18
		30		35			5	
43	9.58 678		9.62 185		0.37 815	9.96 493		17
		31		36			5	
44	9.58 709		9.62 221		0.37 779	9.96 488		16
		30		35			5	
45	9.58 739		9.62 256		0.37 744	9.96 483		15
		30		36			6	
46	9.58 769		9.62 292		0.37 708	9.96 477		14
		30		35			5	
47	9.58 799		9.62 327		0.37 673	9.96 472		13
		30		35			5	
48	9.58 829		9.62 362		0.37 638	9.96 467		12
		30		36			6	
49	9.58 859		9.62 398		0.37 602	9.96 461		11
		30		35			5	
50	9.58 889		9.62 433		0.37 567	9.96 456		10
		30		35			5	
51	9.58 919		9.62 468		0.37 532	9.96 451		9
		30		36			6	
52	9.58 949		9.62 504		0.37 496	9.96 445		8
		30		35			5	
53	9.58 979		9.62 539		0.37 461	9.96 440		7
		30		35			5	
54	9.59 009		9.62 574		0.37 426	9.96 435		6
		30		35			6	
55	9.59 039		9.62 609		0.37 391	9.96 429		5
		30		36			5	
56	9.59 069		9.62 645		0.37 355	9.96 424		4
		29		35			5	
57	9.59 098		9.62 680		0.37 320	9.96 419		3
		30		35			6	
58	9.59 128		9.62 715		0.37 285	9.96 413		2
		30		35			5	
59	9.59 158		9.62 750		0.37 250	9.96 408		1
		30		35			5	
60	9.59 188		9.62 785		0.37 215	9.96 403		0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	

	P	P	
	37	36	35
1	0.6	0.6	0.6
2	1.2	1.2	1.2
3	1.8	1.8	1.8
4	2.5	2.4	2.3
5	3.1	3.0	2.9
6	3.7	3.6	3.5
7	4.3	4.2	4.1
8	4.9	4.8	4.7
9	5.6	5.4	5.2
10	6.2	6.0	5.8
20	12.3	12.0	11.7
30	18.5	18.0	17.5
40	24.7	24.0	23.3
50	30.8	30.0	29.2

	P	P	
	32	31	30
1	0.5	0.5	0.5
2	1.1	1.0	1.0
3	1.6	1.6	1.5
4	2.1	2.1	2.0
5	2.7	2.6	2.5
6	3.2	3.1	3.0
7	3.7	3.6	3.5
8	4.3	4.1	4.0
9	4.8	4.6	4.5
10	5.3	5.2	5.0
20	10.7	10.3	10.0
30	16.0	15.5	15.0
40	21.3	20.7	20.0
50	26.7	25.8	25.0

	P	P	
	29	6	5
1	0.5	0.1	0.1
2	1.0	0.2	0.2
3	1.4	0.3	0.2
4	1.9	0.4	0.3
5	2.4	0.5	0.4
6	2.9	0.6	0.5
7	3.4	0.7	0.6
8	3.9	0.8	0.7
9	4.4	0.9	0.8
10	4.8	1.0	0.8
20	9.7	2.0	1.7
30	14.5	3.0	2.5
40	19.3	4.0	3.3
50	24.2	5.0	4.2

	P	P	
	6	6	
	36	35	
0			
1	3.0	2.9	
2	9.0	8.8	
3	15.0	14.6	
4	21.0	20.4	
5	27.0	26.2	
6	33.0	32.1	

	P	P	
	5	5	5
	37	36	35
0			
1	3.7	3.6	3.5
2	11.1	10.8	10.5
3	18.5	18.0	17.5
4	25.9	25.2	24.5
5	33.3	32.4	31.5

*157° 247° *337°

67°

23°

*113° 203° *293°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d
0	9.59 188		9.62 785	35	0.37 215	9.96 403	6
1	9.59 218	30	9.62 820	35	0.37 180	9.96 397	5
2	9.59 247	29	9.62 855	35	0.37 145	9.96 392	5
3	9.59 277	30	9.62 890	36	0.37 110	9.96 387	6
4	9.59 307	30	9.62 926	35	0.37 074	9.96 381	5
5	9.59 336	29	9.62 961	35	0.37 039	9.96 376	6
6	9.59 366	30	9.62 996	35	0.37 004	9.96 370	5
7	9.59 396	30	9.63 031	35	0.36 969	9.96 365	5
8	9.59 425	29	9.63 066	35	0.36 934	9.96 360	6
9	9.59 455	30	9.63 101	34	0.36 899	9.96 354	5
10	9.59 484	29	9.63 135	35	0.36 865	9.96 349	6
11	9.59 514	30	9.63 170	35	0.36 830	9.96 343	5
12	9.59 543	29	9.63 205	35	0.36 795	9.96 338	5
13	9.59 573	30	9.63 240	35	0.36 760	9.96 333	6
14	9.59 602	29	9.63 275	35	0.36 725	9.96 327	5
15	9.59 632	30	9.63 310	35	0.36 690	9.96 322	6
16	9.59 661	29	9.63 345	34	0.36 655	9.96 316	5
17	9.59 690	29	9.63 379	35	0.36 621	9.96 311	6
18	9.59 720	30	9.63 414	35	0.36 586	9.96 305	5
19	9.59 749	29	9.63 449	35	0.36 551	9.96 300	6
20	9.59 778	29	9.63 484	35	0.36 516	9.96 294	5
21	9.59 808	30	9.63 519	34	0.36 481	9.96 289	5
22	9.59 837	29	9.63 553	35	0.36 447	9.96 284	6
23	9.59 866	29	9.63 588	35	0.36 412	9.96 278	5
24	9.59 895	29	9.63 623	34	0.36 377	9.96 273	6
25	9.59 924	29	9.63 657	35	0.36 343	9.96 267	5
26	9.59 954	30	9.63 692	34	0.36 308	9.96 262	6
27	9.59 983	29	9.63 726	35	0.36 274	9.96 256	5
28	9.60 012	29	9.63 761	35	0.36 239	9.96 251	6
29	9.60 041	29	9.63 796	34	0.36 204	9.96 245	5
30	9.60 070	29	9.63 830	35	0.36 170	9.96 240	6
31	9.60 099	29	9.63 865	34	0.36 135	9.96 234	5
32	9.60 128	29	9.63 899	35	0.36 101	9.96 229	6
33	9.60 157	29	9.63 934	34	0.36 066	9.96 223	5
34	9.60 186	29	9.63 968	35	0.36 032	9.96 218	6
35	9.60 215	29	9.64 003	34	0.35 997	9.96 212	5
36	9.60 244	29	9.64 037	35	0.35 963	9.96 207	6
37	9.60 273	29	9.64 072	34	0.35 928	9.96 201	5
38	9.60 302	29	9.64 106	34	0.35 894	9.96 196	6
39	9.60 331	28	9.64 140	35	0.35 860	9.96 190	5
40	9.60 359	29	9.64 175	34	0.35 825	9.96 185	6
41	9.60 388	29	9.64 209	34	0.35 791	9.96 179	5
42	9.60 417	29	9.64 243	35	0.35 757	9.96 174	6
43	9.60 446	28	9.64 278	34	0.35 722	9.96 168	6
44	9.60 474	29	9.64 312	34	0.35 688	9.96 162	5
45	9.60 503	29	9.64 346	35	0.35 654	9.96 157	6
46	9.60 532	29	9.64 381	34	0.35 619	9.96 151	5
47	9.60 561	28	9.64 415	34	0.35 585	9.96 146	6
48	9.60 589	29	9.64 449	34	0.35 551	9.96 140	5
49	9.60 618	28	9.64 483	34	0.35 517	9.96 135	6
50	9.60 646	29	9.64 517	35	0.35 483	9.96 129	6
51	9.60 675	29	9.64 552	34	0.35 448	9.96 123	5
52	9.60 704	28	9.64 586	34	0.35 414	9.96 118	6
53	9.60 732	29	9.64 620	34	0.35 380	9.96 112	5
54	9.60 761	28	9.64 654	34	0.35 346	9.96 107	6
55	9.60 789	29	9.64 688	34	0.35 312	9.96 101	6
56	9.60 818	28	9.64 722	34	0.35 278	9.96 095	5
57	9.60 846	29	9.64 756	34	0.35 244	9.96 090	6
58	9.60 875	28	9.64 790	34	0.35 210	9.96 084	5
59	9.60 903	28	9.64 824	34	0.35 176	9.96 079	6
60	9.60 931		9.64 858		0.35 142	9.96 073	
	L Cos	d	L Cot	c d	L Tan	L Sin	d

*156° 246° *336°

66°

	P	P	
60	36	35	34
59	1 0.6	0.6	0.6
58	2 1.2	1.2	1.1
57	3 1.8	1.8	1.7
56	4 2.4	2.3	2.3
55	5 3.0	2.9	2.8
54	6 3.6	3.5	3.4
53	7 4.2	4.1	4.0
52	8 4.8	4.7	4.5
51	9 5.4	5.2	5.1
50	10 6.0	5.8	5.7
49	20 12.0	11.7	11.3
48	30 18.0	17.5	17.0
47	40 24.0	23.3	22.7
46	50 30.0	29.2	28.3
45	30	29	28
44	1 0.5	0.5	0.5
43	2 1.0	1.0	0.9
42	3 1.5	1.4	1.4
41	4 2.0	1.9	1.9
40	5 2.5	2.4	2.3
39	6 3.0	2.9	2.8
38	7 3.5	3.4	3.3
37	8 4.0	3.9	3.7
36	9 4.5	4.4	4.2
35	10 5.0	4.8	4.7
34	20 10.0	9.7	9.3
33	30 15.0	14.5	14.0
32	40 20.0	19.3	18.7
31	50 25.0	24.2	23.3
30	6	5	
29	1 0.1	0.1	
28	2 0.2	0.2	
27	3 0.3	0.2	
26	4 0.4	0.3	
25	5 0.5	0.4	
24	6 0.6	0.5	
23	7 0.7	0.6	
22	8 0.8	0.7	
21	9 0.9	0.8	
20	10 1.0	0.8	
19	20 2.0	1.7	
18	30 3.0	2.5	
17	40 4.0	3.3	
16	50 5.0	4.2	

	6	6	6
15	36	35	34
14	0 3.0	2.9	2.8
13	1 9.0	8.8	8.5
12	2 15.0	14.6	14.2
11	3 21.0	20.4	19.8
10	4 27.0	26.2	25.5
9	5 33.0	32.1	31.2
8			

	5	5
7	35	34
6		
5	0	
4	1 3.5	3.4
3	2 10.5	10.2
2	3 17.5	17.0
1	4 24.5	23.8
0	5 31.5	30.6

	P	P

24°

*114° 204° *294°

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.60 931		9.64 858	34	0.35 142	9.96 073	6	60
1	9.60 960	29	9.64 892	34	0.35 108	9.96 067	5	59
2	9.60 988	28	9.64 926	34	0.35 074	9.96 062	6	58
3	9.61 016	28	9.64 960	34	0.35 040	9.96 056	6	57
4	9.61 045	29	9.64 994	34	0.35 006	9.96 050	5	56
5	9.61 073	28	9.65 028	34	0.34 972	9.96 045	6	55
6	9.61 101	28	9.65 062	34	0.34 938	9.96 039	5	54
7	9.61 129	28	9.65 096	34	0.34 904	9.96 034	6	53
8	9.61 158	29	9.65 130	34	0.34 870	9.96 028	6	52
9	9.61 186	28	9.65 164	33	0.34 836	9.96 022	6	51
10	9.61 214	28	9.65 197	34	0.34 803	9.96 017	5	50
11	9.61 242	28	9.65 231	34	0.34 769	9.96 011	6	49
12	9.61 270	28	9.65 265	34	0.34 735	9.96 005	6	48
13	9.61 298	28	9.65 299	34	0.34 701	9.96 000	5	47
14	9.61 326	28	9.65 333	33	0.34 667	9.95 994	6	46
15	9.61 354	28	9.65 366	34	0.34 634	9.95 988	6	45
16	9.61 382	28	9.65 400	34	0.34 600	9.95 982	6	44
17	9.61 411	29	9.65 434	33	0.34 566	9.95 977	5	43
18	9.61 438	27	9.65 467	34	0.34 533	9.95 971	6	42
19	9.61 466	28	9.65 501	34	0.34 499	9.95 965	6	41
20	9.61 494	28	9.65 535	33	0.34 465	9.95 960	5	40
21	9.61 522	28	9.65 568	34	0.34 432	9.95 954	6	39
22	9.61 550	28	9.65 602	34	0.34 398	9.95 948	6	38
23	9.61 578	28	9.65 636	33	0.34 364	9.95 942	6	37
24	9.61 606	28	9.65 669	34	0.34 331	9.95 937	5	36
25	9.61 634	28	9.65 703	33	0.34 297	9.95 931	6	35
26	9.61 662	28	9.65 736	34	0.34 264	9.95 925	6	34
27	9.61 689	27	9.65 770	33	0.34 230	9.95 920	5	33
28	9.61 717	28	9.65 803	34	0.34 197	9.95 914	6	32
29	9.61 745	28	9.65 837	33	0.34 163	9.95 908	6	31
30	9.61 773	28	9.65 870	34	0.34 130	9.95 902	6	30
31	9.61 800	27	9.65 904	33	0.34 096	9.95 897	5	29
32	9.61 828	28	9.65 937	34	0.34 063	9.95 891	6	28
33	9.61 856	28	9.65 971	33	0.34 029	9.95 885	6	27
34	9.61 883	27	9.66 004	34	0.33 996	9.95 879	6	26
35	9.61 911	28	9.66 038	33	0.33 962	9.95 873	6	25
36	9.61 939	28	9.66 071	33	0.33 929	9.95 868	5	24
37	9.61 966	27	9.66 104	34	0.33 896	9.95 862	6	23
38	9.61 994	28	9.66 138	33	0.33 862	9.95 856	6	22
39	9.62 021	27	9.66 171	33	0.33 829	9.95 850	6	21
40	9.62 049	28	9.66 204	34	0.33 796	9.95 844	6	20
41	9.62 076	27	9.66 238	33	0.33 762	9.95 839	5	19
42	9.62 104	28	9.66 271	33	0.33 729	9.95 833	6	18
43	9.62 131	27	9.66 304	33	0.33 696	9.95 827	6	17
44	9.62 159	28	9.66 337	34	0.33 663	9.95 821	6	16
45	9.62 186	27	9.66 371	33	0.33 629	9.95 815	6	15
46	9.62 214	28	9.66 404	33	0.33 596	9.95 810	5	14
47	9.62 241	27	9.66 437	33	0.33 563	9.95 804	6	13
48	9.62 268	27	9.66 470	33	0.33 530	9.95 798	6	12
49	9.62 296	28	9.66 503	34	0.33 497	9.95 792	6	11
50	9.62 323	27	9.66 537	33	0.33 463	9.95 786	6	10
51	9.62 350	27	9.66 570	33	0.33 430	9.95 780	6	9
52	9.62 377	27	9.66 603	33	0.33 397	9.95 775	5	8
53	9.62 405	28	9.66 636	33	0.33 364	9.95 769	6	7
54	9.62 432	27	9.66 669	33	0.33 331	9.95 763	6	6
55	9.62 459	27	9.66 702	33	0.33 298	9.95 757	6	5
56	9.62 486	27	9.66 735	33	0.33 265	9.95 751	6	4
57	9.62 513	27	9.66 768	33	0.33 232	9.95 745	6	3
58	9.62 541	28	9.66 801	33	0.33 199	9.95 739	6	2
59	9.62 568	27	9.66 834	33	0.33 166	9.95 733	5	1
60	9.62 595	27	9.66 867		0.33 133	9.95 728		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

*155° 245° *335°

65°

P P

	34	33
1	0.6	0.6
2	1.1	1.1
3	1.7	1.6
4	2.3	2.2
5	2.8	2.8
6	3.4	3.3
7	4.0	3.8
8	4.5	4.4
9	5.1	5.0
10	5.7	5.5
20	11.3	11.0
30	17.0	16.5
40	22.7	22.0
50	28.3	27.5

	29	28	27
1	0.5	0.5	0.4
2	1.0	0.9	0.9
3	1.4	1.4	1.4
4	1.9	1.9	1.8
5	2.4	2.3	2.2
6	2.9	2.8	2.7
7	3.4	3.3	3.2
8	3.9	3.7	3.6
9	4.4	4.2	4.0
10	4.8	4.7	4.5
20	9.7	9.3	9.0
30	14.5	14.0	13.5
40	19.3	18.7	18.0
50	24.2	23.3	22.5

	6	5
1	0.1	0.1
2	0.2	0.2
3	0.3	0.2
4	0.4	0.3
5	0.5	0.4
6	0.6	0.5
7	0.7	0.6
8	0.8	0.7
9	0.9	0.8
10	1.0	0.8
20	2.0	1.7
30	3.0	2.5
40	4.0	3.3
50	5.0	4.2

	6/34	6/33	5/34
0	2.8	2.8	3.4
1	8.5	8.2	10.2
2	14.2	13.8	17.0
3	19.8	19.2	23.8
4	25.5	24.8	30.6
5	31.2	30.2	—
6			

P P

25°

*115° 205° *295°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d
0	9.62 595		9.66 867		0.33 133	9.95 728	
1	9.62 622	27	9.66 900	33	0.33 100	9.95 722	6
2	9.62 649	27	9.66 933	33	0.33 067	9.95 716	6
3	9.62 676	27	9.66 966	33	0.33 034	9.95 710	6
4	9.62 703	27	9.66 999	33	0.33 001	9.95 704	6
5	9.62 730	27	9.67 032	33	0.32 968	9.95 698	6
6	9.62 757	27	9.67 065	33	0.32 935	9.95 692	6
7	9.62 784	27	9.67 098	33	0.32 902	9.95 686	6
8	9.62 811	27	9.67 131	33	0.32 869	9.95 680	6
9	9.62 838	27	9.67 163	32	0.32 837	9.95 674	6
10	9.62 865	27	9.67 196	33	0.32 804	9.95 668	6
11	9.62 892	27	9.67 229	33	0.32 771	9.95 663	5
12	9.62 918	26	9.67 262	33	0.32 738	9.95 657	6
13	9.62 945	27	9.67 295	33	0.32 705	9.95 651	6
14	9.62 972	27	9.67 327	32	0.32 673	9.95 645	6
15	9.62 999	27	9.67 360	33	0.32 640	9.95 639	6
16	9.63 026	27	9.67 393	33	0.32 607	9.95 633	6
17	9.63 052	26	9.67 426	33	0.32 574	9.95 627	6
18	9.63 079	27	9.67 458	32	0.32 542	9.95 621	6
19	9.63 106	27	9.67 491	33	0.32 509	9.95 615	6
20	9.63 133	27	9.67 524	33	0.32 476	9.95 609	6
21	9.63 159	26	9.67 556	32	0.32 444	9.95 603	6
22	9.63 186	27	9.67 589	33	0.32 411	9.95 597	6
23	9.63 213	27	9.67 622	33	0.32 378	9.95 591	6
24	9.63 239	26	9.67 654	32	0.32 346	9.95 585	6
25	9.63 266	27	9.67 687	33	0.32 313	9.95 579	6
26	9.63 292	26	9.67 719	32	0.32 281	9.95 573	6
27	9.63 319	27	9.67 752	33	0.32 248	9.95 567	6
28	9.63 345	26	9.67 785	33	0.32 215	9.95 561	6
29	9.63 372	27	9.67 817	32	0.32 183	9.95 555	6
30	9.63 398	26	9.67 850	33	0.32 150	9.95 549	6
31	9.63 425	27	9.67 882	32	0.32 118	9.95 543	6
32	9.63 451	26	9.67 915	33	0.32 085	9.95 537	6
33	9.63 478	27	9.67 947	32	0.32 053	9.95 531	6
34	9.63 504	26	9.67 980	33	0.32 020	9.95 525	6
35	9.63 531	27	9.68 012	32	0.31 988	9.95 519	6
36	9.63 557	26	9.68 044	32	0.31 956	9.95 513	6
37	9.63 583	26	9.68 077	33	0.31 923	9.95 507	6
38	9.63 610	27	9.68 109	32	0.31 891	9.95 500	7
39	9.63 636	26	9.68 142	33	0.31 858	9.95 494	6
40	9.63 662	26	9.68 174	32	0.31 826	9.95 488	6
41	9.63 689	27	9.68 206	32	0.31 794	9.95 482	6
42	9.63 715	26	9.68 239	33	0.31 761	9.95 476	6
43	9.63 741	26	9.68 271	32	0.31 729	9.95 470	6
44	9.63 767	26	9.68 303	32	0.31 697	9.95 464	6
45	9.63 794	27	9.68 336	33	0.31 664	9.95 458	6
46	9.63 820	26	9.68 368	32	0.31 632	9.95 452	6
47	9.63 846	26	9.68 400	32	0.31 600	9.95 446	6
48	9.63 872	26	9.68 432	32	0.31 568	9.95 440	6
49	9.63 898	26	9.68 465	33	0.31 535	9.95 434	6
50	9.63 924	26	9.68 497	32	0.31 503	9.95 427	7
51	9.63 950	26	9.68 529	32	0.31 471	9.95 421	6
52	9.63 976	26	9.68 561	32	0.31 439	9.95 415	6
53	9.64 002	26	9.68 593	32	0.31 407	9.95 409	6
54	9.64 028	26	9.68 626	33	0.31 374	9.95 403	6
55	9.64 054	26	9.68 658	32	0.31 342	9.95 397	6
56	9.64 080	26	9.68 690	32	0.31 310	9.95 391	6
57	9.64 106	26	9.68 722	32	0.31 278	9.95 384	7
58	9.64 132	26	9.68 754	32	0.31 246	9.95 378	6
59	9.64 158	26	9.68 786	32	0.31 214	9.95 372	6
60	9.64 184		9.68 818		0.31 182	9.95 366	
	L Cos	d	L Cot	c d	L Tan	L Sin	d

*154° 244° *334°

64°

′	P P
60	
59	
58	33 | 32
57	1 | 0.6 | 0.5
56	2 | 1.1 | 1.1
55	3 | 1.6 | 1.6
54	4 | 2.2 | 2.1
53	5 | 2.8 | 2.7
52	6 | 3.3 | 3.2
51	7 | 3.8 | 3.7
50	8 | 4.4 | 4.3
49	9 | 5.0 | 4.8
48	10 | 5.5 | 5.3
47	20 | 11.0 | 10.7
46	30 | 16.5 | 16.0
45	40 | 22.0 | 21.3
44	50 | 27.5 | 26.7
43	
42	27 | 26
41	1 | 0.4 | 0.4
40	2 | 0.9 | 0.9
39	3 | 1.4 | 1.3
38	4 | 1.8 | 1.7
37	5 | 2.2 | 2.2
36	6 | 2.7 | 2.6
35	7 | 3.2 | 3.0
34	8 | 3.6 | 3.5
33	9 | 4.0 | 3.9
32	10 | 4.5 | 4.3
31	20 | 9.0 | 8.7
30	30 | 13.5 | 13.0
29	40 | 18.0 | 17.3
28	50 | 22.5 | 21.7
27	
26	7 | 6 | 5
25	1 | 0.1 | 0.1 | 0.1
24	2 | 0.2 | 0.2 | 0.2
23	3 | 0.4 | 0.3 | 0.2
22	4 | 0.5 | 0.4 | 0.3
21	5 | 0.6 | 0.5 | 0.4
20	6 | 0.7 | 0.6 | 0.5
19	7 | 0.8 | 0.7 | 0.6
18	8 | 0.9 | 0.8 | 0.7
17	9 | 1.0 | 0.9 | 0.8
16	10 | 1.2 | 1.0 | 0.8
15	20 | 2.3 | 2.0 | 1.7
14	30 | 3.5 | 3.0 | 2.5
13	40 | 4.7 | 4.0 | 3.3
12	50 | 5.8 | 5.0 | 4.2
11	
10	7 | 6 | 5
9	32 | 32 | 33
8	0 | 2.3 | 2.7 | 3.3
7	1 | 6.9 | 8.0 | 9.9
6	2 | 11.4 | 13.3 | 16.5
5	3 | 16.0 | 18.7 | 23.1
4	4 | 20.6 | 24.0 | 29.7
3	5 | 25.1 | 29.3 | —
2	6 | 29.7 | — | —
1	7
0	
′	P P

26°

*116° 206° *296°

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.64 184	26	9.68 818	32	0.31 182	9.95 366	6	60
1	9.64 210	26	9.68 850	32	0.31 150	9.95 360	6	59
2	9.64 236	26	9.68 882	32	0.31 118	9.95 354	6	58
3	9.64 262	26	9.68 914	32	0.31 086	9.95 348	6	57
4	9.64 288	25	9.68 946	32	0.31 054	9.95 341	7	56
5	9.64 313	26	9.68 978	32	0.31 022	9.95 335	6	55
6	9.64 339	26	9.69 010	32	0.30 990	9.95 329	6	54
7	9.64 365	26	9.69 042	32	0.30 958	9.95 323	6	53
8	9.64 391	26	9.69 074	32	0.30 926	9.95 317	6	52
9	9.64 417	25	9.69 106	32	0.30 894	9.95 310	7	51
10	9.64 442	26	9.69 138	32	0.30 862	9.95 304	6	50
11	9.64 468	26	9.69 170	32	0.30 830	9.95 298	6	49
12	9.64 494	25	9.69 202	32	0.30 798	9.95 292	6	48
13	9.64 519	26	9.69 234	32	0.30 766	9.95 286	6	47
14	9.64 545	26	9.69 266	32	0.30 734	9.95 279	7	46
15	9.64 571	25	9.69 298	31	0.30 702	9.95 273	6	45
16	9.64 596	26	9.69 329	32	0.30 671	9.95 267	6	44
17	9.64 622	25	9.69 361	32	0.30 639	9.95 261	6	43
18	9.64 647	26	9.69 393	32	0.30 607	9.95 254	7	42
19	9.64 673	25	9.69 425	32	0.30 575	9.95 248	6	41
20	9.64 698	26	9.69 457	31	0.30 543	9.95 242	6	40
21	9.64 724	25	9.69 488	32	0.30 512	9.95 236	6	39
22	9.64 749	26	9.69 520	32	0.30 480	9.95 229	7	38
23	9.64 775	25	9.69 552	32	0.30 448	9.95 223	6	37
24	9.64 800	26	9.69 584	31	0.30 416	9.95 217	6	36
25	9.64 826	25	9.69 615	32	0.30 385	9.95 211	6	35
26	9.64 851	26	9.69 647	32	0.30 353	9.95 204	7	34
27	9.64 877	25	9.69 679	31	0.30 321	9.95 198	6	33
28	9.64 902	25	9.69 710	32	0.30 290	9.95 192	6	32
29	9.64 927	26	9.69 742	32	0.30 258	9.95 185	7	31
30	9.64 953	25	9.69 774	31	0.30 226	9.95 179	6	30
31	9.64 978	25	9.69 805	32	0.30 195	9.95 173	6	29
32	9.65 003	26	9.69 837	31	0.30 163	9.95 167	6	28
33	9.65 029	25	9.69 868	32	0.30 132	9.95 160	7	27
34	9.65 054	25	9.69 900	32	0.30 100	9.95 154	6	26
35	9.65 079	25	9.69 932	31	0.30 068	9.95 148	6	25
36	9.65 104	26	9.69 963	32	0.30 037	9.95 141	7	24
37	9.65 130	25	9.69 995	31	0.30 005	9.95 135	6	23
38	9.65 155	25	9.70 026	32	0.29 974	9.95 129	6	22
39	9.65 180	25	9.70 058	31	0.29 942	9.95 122	7	21
40	9.65 205	25	9.70 089	32	0.29 911	9.95 116	6	20
41	9.65 230	25	9.70 121	31	0.29 879	9.95 110	6	19
42	9.65 255	26	9.70 152	32	0.29 848	9.95 103	7	18
43	9.65 281	25	9.70 184	31	0.29 816	9.95 097	6	17
44	9.65 306	25	9.70 215	32	0.29 785	9.95 090	7	16
45	9.65 331	25	9.70 247	31	0.29 753	9.95 084	6	15
46	9.65 356	25	9.70 278	31	0.29 722	9.95 078	6	14
47	9.65 381	25	9.70 309	32	0.29 691	9.95 071	7	13
48	9.65 406	25	9.70 341	31	0.29 659	9.95 065	6	12
49	9.65 431	25	9.70 372	32	0.29 628	9.95 059	6	11
50	9.65 456	25	9.70 404	31	0.29 596	9.95 052	7	10
51	9.65 481	25	9.70 435	31	0.29 565	9.95 046	6	9
52	9.65 506	25	9.70 466	32	0.29 534	9.95 039	7	8
53	9.65 531	25	9.70 498	31	0.29 502	9.95 033	6	7
54	9.65 556	24	9.70 529	31	0.29 471	9.95 027	6	6
55	9.65 580	25	9.70 560	32	0.29 440	9.95 020	7	5
56	9.65 605	25	9.70 592	31	0.29 408	9.95 014	6	4
57	9.65 630	25	9.70 623	31	0.29 377	9.95 007	7	3
58	9.65 655	25	9.70 654	31	0.29 346	9.95 001	6	2
59	9.65 680	25	9.70 685	32	0.29 315	9.94 995	6	1
60	9.65 705	25	9.70 717		0.29 283	9.94 988	7	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

*153° 243° *333°

63°

P P

	32	31
1	0.5	0.5
2	1.1	1.0
3	1.6	1.6
4	2.1	2.1
5	2.7	2.6
6	3.2	3.1
7	3.7	3.6
8	4.3	4.1
9	4.8	4.6
10	5.3	5.2
20	10.7	10.3
30	16.0	15.5
40	21.3	20.7
50	26.7	25.8

	26	25	24
1	0.4	0.4	0.4
2	0.9	0.8	0.8
3	1.3	1.2	1.2
4	1.7	1.7	1.6
5	2.2	2.1	2.0
6	2.6	2.5	2.4
7	3.0	2.9	2.8
8	3.5	3.3	3.2
9	3.9	3.8	3.6
10	4.3	4.2	4.0
20	8.7	8.3	8.0
30	13.0	12.5	12.0
40	17.3	16.7	16.0
50	21.7	20.8	20.0

	7	6
1	0.1	0.1
2	0.2	0.2
3	0.4	0.3
4	0.5	0.4
5	0.6	0.5
6	0.7	0.6
7	0.8	0.7
8	0.9	0.8
9	1.0	0.9
10	1.2	1.0
20	2.3	2.0
30	3.5	3.0
40	4.7	4.0
50	5.8	5.0

	$\frac{7}{32}$	$\frac{7}{31}$	$\frac{6}{32}$
0	2.3	2.2	2.7
1	0.9	6.6	8.0
2	11.4	11.1	13.3
3	16.0	15.5	18.7
4	20.6	19.9	24.0
5	25.1	24.4	29.3
6	29.7	28.8	—
7			

P P

27°

*117° 207° *297°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.65 705	24	9.70 717	31	0.29 283	9.94 988	6	60
1	9.65 729	25	9.70 748	31	0.29 252	9.94 982	7	59
2	9.65 754	25	9.70 779	31	0.29 221	9.94 975	6	58
3	9.65 779	25	9.70 810	31	0.29 190	9.94 969	7	57
4	9.65 804	24	9.70 841	32	0.29 159	9.94 962	6	56
5	9.65 828	25	9.70 873	31	0.29 127	9.94 956	7	55
6	9.65 853	25	9.70 904	31	0.29 096	9.94 949	6	54
7	9.65 878	24	9.70 935	31	0.29 065	9.94 943	7	53
8	9.65 902	25	9.70 966	31	0.29 034	9.94 936	6	52
9	9.65 927	25	9.70 997	31	0.29 003	9.94 930	7	51
10	9.65 952	24	9.71 028	31	0.28 972	9.94 923	6	50
11	9.65 976	25	9.71 059	31	0.28 941	9.94 917	6	49
12	9.66 001	24	9.71 090	31	0.28 910	9.94 911	7	48
13	9.66 025	25	9.71 121	32	0.28 879	9.94 904	6	47
14	9.66 050	25	9.71 153	31	0.28 847	9.94 898	7	46
15	9.66 075	24	9.71 184	31	0.28 816	9.94 891	6	45
16	9.66 099	25	9.71 215	31	0.28 785	9.94 885	7	44
17	9.66 124	24	9.71 246	31	0.28 754	9.94 878	7	43
18	9.66 148	25	9.71 277	31	0.28 723	9.94 871	6	42
19	9.66 173	24	9.71 308	31	0.28 692	9.94 865	7	41
20	9.66 197	24	9.71 339	31	0.28 661	9.94 858	6	40
21	9.66 221	25	9.71 370	31	0.28 630	9.94 852	7	39
22	9.66 246	24	9.71 401	30	0.28 599	9.94 845	6	38
23	9.66 270	25	9.71 431	31	0.28 569	9.94 839	7	37
24	9.66 295	24	9.71 462	31	0.28 538	9.94 832	6	36
25	9.66 319	24	9.71 493	31	0.28 507	9.94 826	7	35
26	9.66 343	25	9.71 524	31	0.28 476	9.94 819	6	34
27	9.66 368	24	9.71 555	31	0.28 445	9.94 813	7	33
28	9.66 392	24	9.71 586	31	0.28 414	9.94 806	7	32
29	9.66 416	25	9.71 617	31	0.28 383	9.94 799	6	31
30	9.66 441	24	9.71 648	31	0.28 352	9.94 793	7	30
31	9.66 465	24	9.71 679	30	0.28 321	9.94 786	7	29
32	9.66 489	24	9.71 709	31	0.28 291	9.94 780	6	28
33	9.66 513	24	9.71 740	31	0.28 260	9.94 773	6	27
34	9.66 537	25	9.71 771	31	0.28 229	9.94 767	7	26
35	9.66 562	24	9.71 802	31	0.28 198	9.94 760	7	25
36	9.66 586	24	9.71 833	30	0.28 167	9.94 753	6	24
37	9.66 610	24	9.71 863	31	0.28 137	9.94 747	7	23
38	9.66 634	24	9.71 894	31	0.28 106	9.94 740	6	22
39	9.66 658	24	9.71 925	30	0.28 075	9.94 734	7	21
40	9.66 682	24	9.71 955	31	0.28 045	9.94 727	7	20
41	9.66 706	25	9.71 986	31	0.28 014	9.94 720	7	19
42	9.66 731	24	9.72 017	31	0.27 983	9.94 714	6	18
43	9.66 755	24	9.72 048	30	0.27 952	9.94 707	7	17
44	9.66 779	24	9.72 078	31	0.27 922	9.94 700	7	16
45	9.66 803	24	9.72 109	31	0.27 891	9.94 694	6	15
46	9.66 827	24	9.72 140	30	0.27 860	9.94 687	7	14
47	9.66 851	24	9.72 170	31	0.27 830	9.94 680	7	13
48	9.66 875	24	9.72 201	30	0.27 799	9.94 674	6	12
49	9.66 899	23	9.72 231	31	0.27 769	9.94 667	7	11
50	9.66 922	24	9.72 262	31	0.27 738	9.94 660	7	10
51	9.66 946	24	9.72 293	30	0.27 707	9.94 654	6	9
52	9.66 970	24	9.72 323	31	0.27 677	9.94 647	7	8
53	9.66 994	24	9.72 354	30	0.27 646	9.94 640	7	7
54	9.67 018	24	9.72 384	31	0.27 616	9.94 634	6	6
55	9.67 042	24	9.72 415	30	0.27 585	9.94 627	7	5
56	9.67 066	24	9.72 445	31	0.27 555	9.94 620	7	4
57	9.67 090	23	9.72 476	30	0.27 524	9.94 614	6	3
58	9.67 113	24	9.72 506	31	0.27 494	9.94 607	7	2
59	9.67 137	24	9.72 537	30	0.27 463	9.94 600	7	1
60	9.67 161		9.72 567		0.27 433	9.94 593	7	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

P	P		
	32	31	30
1	0.5	0.5	0.5
2	1.1	1.0	1.0
3	1.6	1.6	1.5
4	2.1	2.1	2.0
5	2.7	2.6	2.5
6	3.2	3.1	3.0
7	3.7	3.6	3.5
8	4.3	4.1	4.0
9	4.8	4.6	4.5
10	5.3	5.2	5.0
20	10.7	10.3	10.0
30	16.0	15.5	15.0
40	21.3	20.7	20.0
50	26.7	25.8	25.0

P	P		
	25	24	23
1	0.4	0.4	0.4
2	0.8	0.8	0.8
3	1.2	1.2	1.2
4	1.7	1.6	1.5
5	2.1	2.0	1.9
6	2.5	2.4	2.3
7	2.9	2.8	2.7
8	3.3	3.2	3.1
9	3.8	3.6	3.4
10	4.2	4.0	3.8
20	8.3	8.0	7.7
30	12.5	12.0	11.5
40	16.7	16.0	15.3
50	20.8	20.0	19.2

P	P	
	7	6
1	0.1	0.1
2	0.2	0.2
3	0.4	0.3
4	0.5	0.4
5	0.6	0.5
6	0.7	0.6
7	0.8	0.7
8	0.9	0.8
9	1.0	0.9
10	1.2	1.0
20	2.3	2.0
30	3.5	3.0
40	4.7	4.0
50	5.8	5.0

P	P		
	7/30	6/31	6/30
0			
1	2.1	2.6	2.5
2	6.4	7.8	7.5
3	10.7	12.9	12.5
4	15.0	18.1	17.5
5	19.3	23.2	22.5
6	23.6	28.4	27.5
7	27.9	—	—

*152° 242° *332°

28°

*118° 208° *298°

'	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.67 161		9.72 567		0.27 433	9.94 593		60
		24		31			6	
1	9.67 185		9.72 598		0.27 402	9.94 587		59
2	9.67 208	23	9.72 628	30	0.27 372	9.94 580	7	58
3	9.67 232	24	9.72 659	31	0.27 341	9.94 573	7	57
		24		30			6	
4	9.67 256		9.72 689		0.27 311	9.94 567	7	56
5	9.67 280	24	9.72 720	31	0.27 280	9.94 560	7	55
6	9.67 303	23	9.72 750	30	0.27 250	9.94 553	7	54
		24		30			7	
7	9.67 327		9.72 780		0.27 220	9.94 546	6	53
8	9.67 350	23	9.72 811	31	0.27 189	9.94 540	7	52
9	9.67 374	24	9.72 841	30	0.27 159	9.94 533	7	51
10	9.67 398	24	9.72 872	31	0.27 128	9.94 526	7	50
11	9.67 421	23	9.72 902	30	0.27 098	9.94 519	7	49
12	9.67 445	24	9.72 932	30	0.27 068	9.94 513	6	48
13	9.67 468	23	9.72 963	31	0.27 037	9.94 506	7	47
		24		30			7	
14	9.67 492		9.72 993		0.27 007	9.94 499	7	46
15	9.67 515	23	9.73 023	30	0.26 977	9.94 492	7	45
16	9.67 539	24	9.73 054	31	0.26 946	9.94 485	7	44
		23		30			6	
17	9.67 562		9.73 084		0.26 916	9.94 479	7	43
18	9.67 586	24	9.73 114	30	0.26 886	9.94 472	7	42
19	9.67 609	23	9.73 144	30	0.26 856	9.94 465	7	41
20	9.67 633	24	9.73 175	31	0.26 825	9.94 458	7	40
21	9.67 656	23	9.73 205	30	0.26 795	9.94 451	7	39
22	9.67 680	24	9.73 235	30	0.26 765	9.94 445	6	38
23	9.67 703	23	9.73 265	30	0.26 735	9.94 438	7	37
		23		30			7	
24	9.67 726		9.73 295		0.26 705	9.94 431	7	36
25	9.67 750	24	9 73 326	31	0.26 674	9.94 424	7	35
26	9.67 773	23	9.73 356	30	0.26 644	9.94 417	7	34
		23		30			7	
27	9.67 796		9.73 386		0.26 614	9.94 410	6	33
28	9.67 820	24	9.73 416	30	0.26 584	9.94 404	7	32
29	9.67 843	23	9.73 446	30	0.26 554	9.94 397	7	31
30	9.67 866	23	9.73 476	30	0.26 524	9.94 390	7	30
31	9.67 890	24	9.73 507	31	0.26 493	9.94 383	7	29
32	9.67 913	23	9.73 537	30	0.26 463	9.94 376	7	28
33	9.67 936	23	9.73 567	30	0.26 433	9.94 369	7	27
		23		30			7	
34	9.67 959		9.73 597		0.26 403	9.94 362	7	26
35	9.67 982	23	9.73 627	30	0.26 373	9.94 355	7	25
36	9.68 006	24	9.73 657	30	0.26 343	9.94 349	6	24
		23		30			7	
37	9.68 029		9.73 687		0.26 313	9.94 342	7	23
38	9.68 052	23	9.73 717	30	0.26 283	9.94 335	7	22
39	9.68 075	23	9.73 747	30	0.26 253	9.94 328	7	21
40	9.68 098	23	9.73 777	30	0.26 223	9.94 321	7	20
		23		30			7	
41	9.68 121		9.73 807		0.26 193	9.94 314	7	19
42	9.68 144	23	9.73 837	30	0.26 163	9.94 307	7	18
43	9.68 167	23	9.73 867	30	0.26 133	9.94 300	7	17
		23		30			7	
44	9.68 190		9.73 897		0.26 103	9.94 293	7	16
45	9.68 213	23	9.73 927	30	0.26 073	9.94 286	7	15
46	9.68 237	24	9.73 957	30	0.26 043	9.94 279	6	14
		23		30			7	
47	9 68 260		9.73 987		0.26 013	9.94 273	7	13
48	9.68 283	23	9.74 017	30	0.25 983	9.94 266	7	12
49	9.68 305	22	9.74 047	30	0.25 953	9.94 259	7	11
50	9.68 328	23	9.74 077	30	0.25 923	9.94 252	7	10
		23		30			7	
51	9.68 351		9.74 107		0.25 893	9.94 245	7	9
52	9.68 374	23	9.74 137	30	0.25 863	9.94 238	7	8
53	9.68 397	23	9.74 166	29	0.25 834	9.94 231	7	7
		23		30			7	
54	9.68 420		9.74 196		0.25 804	9.94 224	7	6
55	9.68 443	23	9.74 226	30	0.25 774	9.94 217	7	5
56	9.68 466	23	9.74 256	30	0.25 744	9.94 210	7	4
		23		30			7	
57	9.68 489		9.74 286		0.25 714	9.94 203	7	3
58	9.68 512	23	9.74 316	30	0.25 684	9.94 196	7	2
59	9.68 534	22	9.74 345	29	0.25 655	9.94 189	7	1
60	9.68 557	23	9.74 375	30	0.25 625	9.94 182	7	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

*151° 241° *331°

61°

P P

	31	30	29
1	0 5	0.5	0.5
2	1.0	1.0	1.0
3	1.6	1.5	1.4
4	2.1	2.0	1.9
5	2.6	2.5	2.4
6	3.1	3.0	2.9
7	3.6	3.5	3.4
8	4.1	4.0	3.9
9	4.6	4.5	4.4
10	5.2	5.0	4.8
20	10.3	10.0	9.7
30	15.5	15.0	14.5
40	20.7	20.0	19.3
50	25.8	25.0	24.2

	24	23	22
1	0.4	0.4	0.4
2	0.8	0.8	0.7
3	1.2	1.2	1.1
4	1.6	1.5	1.5
5	2.0	1.9	1.8
6	2.4	2.3	2.2
7	2.8	2.7	2.6
8	3.2	3.1	2 9
9	3.6	3.4	3.3
10	4.0	3.8	3.7
20	8.0	7.7	7.3
30	12.0	11.5	11.0
40	16.0	15.3	14.7
50	20.0	19.2	18.3

	7	6
1	0.1	0.1
2	0.2	0.2
3	0.4	0.3
4	0.5	0.4
5	0.6	0.5
6	0.7	0.6
7	0.8	0.7
8	0.9	0.8
9	1.0	0.9
10	1.2	1.0
20	2.3	2.0
30	3.5	3.0
40	4.7	4.0
50	5.8	5.0

	7/31	6/31	6/30
0			
1	2.2	2.6	2.5
2	6.6	7.8	7.5
3	11.1	12.9	12.5
4	15.5	18.1	17.5
5	19.9	23.2	22.5
6	24.4	28.4	27.5
7	28.8	—	—

P P

29°

*119° 209° *299°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.68 557		9.74 375		0.25 625	9.94 182		60
1	9.68 580	23	9.74 40$\bar{5}$	30	0.25 595	9.94 17$\bar{5}$	7	59
2	9.68 603	23	9.74 43$\bar{5}$	30	0.25 565	9.94 168	7	58
3	9.68 625	22	9.74 46$\bar{5}$	30	0.25 535	9.94 161	7	57
4	9.68 648	23	9.74 494	29	0.25 506	9.94 154	7	56
5	9.68 671	23	9.74 524	30	0.25 476	9.94 147	7	55
6	9.68 694	23	9.74 554	30	0.25 446	9.94 140	7	54
7	9.68 716	22	9.74 583	29	0.25 417	9.94 133	7	53
8	9.68 739	23	9.74 613	30	0.25 387	9.94 126	7	52
9	9.68 762	23	9.74 643	30	0.25 357	9.94 119	7	51
10	9.68 784	22	9.74 673	30	0.25 327	9.94 112	7	50
11	9.68 807	23	9.74 702	29	0.25 298	9.94 10$\bar{5}$	7	49
12	9.68 829	22	9.74 732	30	0.25 268	9.94 098	7	48
13	9.68 852	23	9.74 762	30	0.25 238	9.94 090	8	47
14	9.68 87$\bar{5}$	23	9.74 791	29	0.25 209	9.94 083	7	46
15	9.68 897	22	9.74 821	30	0.25 179	9.94 076	7	45
16	9.68 920	23	9.74 851	30	0.25 149	9.94 069	7	44
17	9.68 942	22	9.74 880	29	0.25 120	9.94 062	7	43
18	9.68 96$\bar{5}$	23	9.74 910	30	0.25 090	9.94 055	7	42
19	9.68 987	22	9.74 939	29	0.25 061	9.94 048	7	41
20	9.69 010	23	9.74 969	30	0.25 031	9.94 041	7	40
21	9.69 032	22	9.74 998	29	0.25 002	9.94 034	7	39
22	9.69 055	23	9.75 028	30	0.24 972	9.94 027	7	38
23	9.69 077	22	9.75 058	30	0.24 942	9.94 020	8	37
24	9.69 100	23	9.75 087	29	0.24 913	9.94 012	7	36
25	9.69 122	22	9.75 117	30	0.24 883	9.94 005	7	35
26	9.69 144	22	9.75 146	29	0.24 854	9.93 998	7	34
27	9.69 167	23	9.75 176	30	0.24 824	9.93 991	7	33
28	9.69 189	22	9.75 205	29	0.24 79$\bar{5}$	9.93 984	7	32
29	9.69 212	23	9.75 23$\bar{5}$	30	0.24 76$\bar{5}$	9.93 977	7	31
30	9.69 234	22	9.75 264	29	0.24 736	9.93 970	7	30
31	9.69 256	22	9.75 294	30	0.24 706	9.93 963	7	29
32	9.69 279	23	9.75 323	29	0.24 677	9.93 955	8	28
33	9.69 301	22	9.75 353	30	0.24 647	9.93 948	7	27
34	9.69 323	22	9.75 382	29	0.24 618	9.93 941	7	26
35	9.69 345	22	9.75 411	29	0.24 589	9.93 934	7	25
36	9.69 368	23	9.75 441	30	0.24 559	9.93 927	7	24
37	9.69 390	22	9.75 470	29	0.24 530	9.93 920	7	23
38	9.69 412	22	9.75 5̄00	30	0.24 500	9.93 912	8	22
39	9.69 434	22	9.75 529	29	0.24 471	9.93 905	7	21
40	9.69 456	22	9.75 558	29	0.24 442	9.93 898	7	20
41	9.69 479	23	9.75 588	30	0.24 412	9.93 891	7	19
42	9.69 501	22	9.75 617	29	0.24 383	9.93 884	7	18
43	9.69 523	22	9.75 647	30	0.24 353	9.93 876	8	17
44	9.69 545	22	9.75 676	29	0.24 324	9.93 869	7	16
45	9.69 567	22	9.75 705	29	0.24 29$\bar{5}$	9.93 862	7	15
46	9.69 589	22	9.75 73$\bar{5}$	30	0.24 265	9.93 85$\bar{5}$	7	14
47	9.69 611	22	9.75 764	29	0.24 236	9.93 847	8	13
48	9.69 633	22	9.75 793	29	0.24 207	9.93 840	7	12
49	9.69 655	22	9.75 822	29	0.24 178	9.93 833	7	11
50	9.69 677	22	9.75 852	30	0.24 148	9.93 826	7	10
51	9.69 699	22	9.75 881	29	0.24 119	9.93 819	8	9
52	9.69 721	22	9.75 910	29	0.24 090	9.93 811	7	8
53	9.69 743	22	9.75 939	29	0.24 061	9.93 804	7	7
54	9.69 765	22	9.75 969	30	0.24 031	9.93 797	8	6
55	9.69 787	22	9.75 998	29	0.24 002	9.93 789	7	5
56	9.69 809	22	9.76 027	29	0.23 973	9.93 782	7	4
57	9.69 831	22	9.76 056	29	0.23 944	9.93 77$\bar{5}$	7	3
58	9.69 853	22	9.76 086	30	0.23 914	9.93 768	8	2
59	9.69 875	22	9.76 11$\bar{5}$	29	0.23 88$\bar{5}$	9.93 760	7	1
60	9.69 897		9.76 144	29	0.23 856	9.93 753		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

*150° 240° *330°

60°

	P	P
	30	29
1	0.5	0.5
2	1.0	1.0
3	1.5	1.4
4	2.0	1.9
5	2.5	2.4
6	3.0	2.9
7	3.5	3.4
8	4.0	3.9
9	4.5	4.4
10	5.0	4.8
20	10.0	9.7
30	15.0	14.5
40	20.0	19.3
50	25.0	24.2

	P		
	22	8	7
1	0.4	0.1	0.1
2	0.7	0.3	0.2
3	1.1	0.4	0.4
4	1.5	0.5	0.5
5	1.8	0.7	0.6
6	2.2	0.8	0.7
7	2.6	0.9	0.8
8	2.9	1.1	0.9
9	3.3	1.2	1.0
10	3.7	1.3	1.2
20	7.3	2.7	2.3
30	11.0	4.0	3.5
40	14.7	5.3	4.7
50	18.3	6.7	5.8

	P	P
	8	8
	30	29
0		
1	1.9	1.8
2	5.6	5.4
3	9.4	9.1
4	13.1	12.7
5	16.9	16.3
6	20.6	19.9
7	24.4	23.6
8	28.1	27.2

	P	P
	7	7
	30	29
0		
1	2.1	2.1
2	6.4	6.2
3	10.7	10.4
4	15.0	14.5
5	19.3	18.6
6	23.6	22.8
7	27.9	26.9

30°

*120° 210° *300°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.69 897		9.76 144		0.23 856	9.93 753		60
		22		29			7	
1	9.69 919		9.76 173		0.23 827	9.93 746		59
2	9.69 941	22	9.76 202	29	0.23 798	9.93 738	8	58
3	9.69 963	22	9.76 231	29	0.23 769	9 93 731	7	57
		21		30			7	
4	9.69 984		9.76 261		0.23 739	9.93 724		56
5	9.70 006	22	9.76 290	29	0.23 710	9.93 717	7	55
6	9.70 028	22	9.76 319	29	0.23 681	9.93 709	8	54
		22		29			7	
7	9.70 050		9.76 348		0.23 652	9.93 702		53
8	9.70 072	22	9.76 377	29	0.23 623	9.93 695	7	52
9	9.70 093	21	9.76 406	29	0.23 594	9.93 687	8	51
10	9.70 115	22	9.76 435	29	0.23 565	9.93 680	7	50
11	9.70 137		9.76 464	29	0.23 536	9.93 673	7	49
12	9.70 159	22	9.76 493	29	0.23 507	9.93 665	8	48
13	9.70 180	21	9.76 522	29	0.23 478	9.93 658	7	47
		22		29			8	
14	9.70 202		9.76 551		0.23 449	9.93 650		46
15	9.70 224	22	9.76 580	29	0.23 420	9.93 643	7	45
16	9.70 245	21	9.76 609	29	0.23 391	9.93 636	7	44
		22		30			8	
17	9.70 267		9.76 639		0.23 361	9.93 628		43
18	9.70 288	21	9.76 668	29	0.23 332	9.93 621	7	42
19	9.70 310	22	9.76 697	29	0.23 303	9.93 614	7	41
20	9.70 332	22	9.76 725	28	0.23 275	9.93 606	8	40
		21		29			7	
21	9.70 353		9.76 754		0.23 246	9.93 599		39
22	9.70 375	22	9.76 783	29	0.23 217	9.93 591	8	38
23	9.70 396	21	9.76 812	29	0.23 188	9.93 584	7	37
		22		29			7	
24	9.70 418		9.76 841		0.23 159	9.93 577		36
25	9.70 439	21	9.76 870	29	0.23 130	9.93 569	8	35
26	9.70 461	22	9.76 899	29	0.23 101	9.93 562	7	34
		21		29			8	
27	9.70 482		9.76 928		0.23 072	9.93 554		33
28	9.70 504	22	9.76 957	29	0.23 043	9.93 547	7	32
29	9.70 525	21	9.76 986	29	0.23 014	9.93 539	8	31
30	9.70 547	22	9.77 015	29	0.22 985	9.93 532	7	30
31	9.70 568	21	9.77 044	29	0.22 956	9.93 525	7	29
32	9.70 590	22	9.77 073	29	0.22 927	9.93 517	8	28
33	9.70 611	21	9.77 101	28	0.22 899	9.93 510	7	27
		22		29			8	
34	9.70 633		9.77 130		0.22 870	9.93 502		26
35	9.70 654	21	9.77 159	29	0.22 841	9.93 495	7	25
36	9.70 675	21	9.77 188	29	0.22 812	9.93 487	8	24
		22		29			7	
37	9.70 697		9.77 217		0.22 783	9.93 480		23
38	9.70 718	21	9.77 246	29	0.22 754	9.93 472	8	22
39	9.70 739	21	9.77 274	28	0.22 726	9.93 465	7	21
40	9.70 761	22	9.77 303	29	0.22 697	9.93 457	8	20
		21		29			7	
41	9.70 782		9.77 332		0.22 668	9.93 450		19
42	9.70 803	21	9.77 361	29	0.22 639	9.93 442	8	18
43	9.70 824	21	9.77 390	29	0.22 610	9.93 435	7	17
		22		28			8	
44	9.70 846		9.77 418		0.22 582	9.93 427		16
45	9.70 867	21	9.77 447	29	0.22 553	9.93 420	7	15
46	9.70 888	21	9.77 476	29	0.22 524	9.93 412	8	14
		21		29			7	
47	9.70 909		9.77 505		0.22 495	9.93 405		13
48	9.70 931	22	9.77 533	28	0.22 467	9.93 397	8	12
49	9.70 952	21	9.77 562	29	0.22 438	9.93 390	7	11
50	9.70 973	21	9.77 591	29	0.22 409	9.93 382	8	10
		21		28			7	
51	9.70 994		9.77 619		0.22 381	9.93 375		9
52	9.71 015	21	9.77 648	29	0.22 352	9.93 367	8	8
53	9.71 036	21	9.77 677	29	0.22 323	9.93 360	7	7
		22		29			8	
54	9.71 058		9.77 706		0.22 294	9.93 352		6
55	9.71 079	21	9.77 734	28	0.22 266	9.93 344	8	5
56	9.71 100	21	9.77 763	29	0.22 237	9.93 337	7	4
		21		28			8	
57	9.71 121		9.77 791		0.22 209	9.93 329		3
58	9.71 142	21	9.77 820	29	0.22 180	9.93 322	7	2
59	9.71 163	21	9.77 849	29	0.22 151	9.93 314	8	1
60	9.71 184	21	9.77 877	28	0.22 123	9.93 307	7	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

*180° 240° *360°

59°

P P

	30	29	28
1	0.5	0.5	0.5
2	1.0	1.0	0.9
3	1.5	1.4	1.4
4	2.0	1.9	1.9
5	2.5	2.4	2.3
6	3.0	2.9	2.8
7	3.5	3.4	3.3
8	4.0	3.9	3.7
9	4.5	4.4	4.2
10	5.0	4.8	4.7
20	10.0	9.7	9.3
30	15.0	14.5	14.0
40	20.0	19.3	18.7
50	25.0	24.2	23.3

	22	21
1	0.4	0.4
2	0.7	0.7
3	1.1	1.0
4	1.5	1.4
5	1.8	1.8
6	2.2	2.1
7	2.6	2.4
8	2.9	2.8
9	3.3	3.2
10	3.7	3.5
20	7.3	7.0
30	11.0	10.5
40	14.7	14.0
50	18.3	17.5

	8	7
1	0.1	0.1
2	0.3	0.2
3	0.4	0.4
4	0.5	0.5
5	0.7	0.6
6	0.8	0.7
7	0.9	0.8
8	1.1	0.9
9	1.2	1.0
10	1.3	1.2
20	2.7	2.3
30	4.0	3.5
40	5.3	4.7
50	6.7	5.8

	$\frac{7}{30}$	$\frac{7}{29}$	$\frac{7}{28}$
0	2.1	2.1	2.0
1	6.4	6.2	6.0
2	10.7	10.4	10.0
3	15.0	14.5	14.0
4	19.3	18.6	18.0
5	23.6	22.8	22.0
6	27.9	26.9	26.0
7			

31°

*121° 211° *301°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.71 184		9.77 877		0.22 123	9.93 307		60
		21		29			8	
1	9.71 205		9.77 906		0.22 094	9.93 299		59
		21		29			8	
2	9.71 226		9.77 935		0.22 065	9.93 291		58
		21		28			7	
3	9.71 247		9.77 963		0.22 037	9.93 284	8	57
		21		29				
4	9.71 268		9.77 992		0.22 008	9.93 276		56
		21		28			7	
5	9.71 289		9.78 020		0.21 980	9.93 269	8	55
		21		29				
6	9.71 310		9.78 049		0.21 951	9.93 261		54
		21		28			8	
7	9.71 331		9.78 077		0.21 923	9.93 253		53
		21		29			7	
8	9.71 352		9.78 106		0.21 894	9.93 246	8	52
		21		29				
9	9.71 373		9.78 135		0.21 865	9.93 238		51
		20		28			8	
10	9.71 393		9.78 163		0.21 837	9.93 230		50
		21		29			7	
11	9.71 414		9.78 192		0.21 808	9.93 223	8	49
		21		28				
12	9.71 435		9.78 220		0.21 780	9.93 215		48
		21		29			8	
13	9.71 456		9.78 249		0.21 751	9.93 207		47
		21		28			7	
14	9.71 477		9.78 277		0.21 723	9.93 200	8	46
		21		29				
15	9.71 498		9.78 306		0.21 694	9.93 192		45
		21		28			8	
16	9.71 519		9.78 334		0.21 666	9.93 184		44
		20		29			7	
17	9.71 539		9.78 363		0.21 637	9.93 177	8	43
		21		28				
18	9.71 560		9.78 391		0.21 609	9.93 169		42
		21		28			8	
19	9.71 581		9.78 419		0.21 581	9.93 161		41
		21		29			7	
20	9.71 602		9.78 448		0.21 552	9.93 154	8	40
		20		28				
21	9.71 622		9.78 476		0.21 524	9.93 146		39
		21		29			8	
22	9.71 643		9.78 505		0.21 495	9.93 138		38
		21		28			7	
23	9.71 664		9.78 533		0.21 467	9.93 131	8	37
		21		29				
24	9.71 685		9.78 562		0.21 438	9.93 123		36
		20		28			8	
25	9.71 705		9.78 590		0.21 410	9.93 115		35
		21		28			7	
26	9.71 726		9.78 618		0.21 382	9.93 108	8	34
		21		29				
27	9.71 747		9.78 647		0.21 353	9.93 100		33
		20		28			8	
28	9.71 767		9.78 675		0.21 325	9.93 092		32
		21		29			8	
29	9.71 788		9.78 704		0.21 296	9.93 084		31
		21		28			7	
30	9.71 809		9.78 732		0.21 268	9.93 077	8	30
		20		28				
31	9.71 829		9.78 760		0.21 240	9.93 069		29
		21		29			8	
32	9.71 850		9.78 789		0.21 211	9.93 061		28
		20		28			8	
33	9.71 870		9.78 817		0.21 183	9.93 053		27
		21		28			7	
34	9.71 891		9.78 845		0.21 155	9.93 046	8	26
		20		29				
35	9.71 911		9.78 874		0.21 126	9.93 038		25
		21		28			8	
36	9.71 932		9.78 902		0.21 098	9.93 030		24
		20		28			8	
37	9.71 952		9.78 930		0.21 070	9.93 022		23
		21		29			8	
38	9.71 973		9.78 959		0.21 041	9.93 014		22
		21		28			7	
39	9.71 994		9.78 987		0.21 013	9.93 007	8	21
		20		28				
40	9.72 014		9.79 015		0.20 985	9.92 999		20
		20		28			8	
41	9.72 034		9.79 043		0.20 957	9.92 991		19
		21		29			8	
42	9.72 055		9.79 072		0.20 928	9.92 983		18
		20		28			7	
43	9.72 075		9.79 100		0.20 900	9.92 976	8	17
		21		28				
44	9.72 096		9.79 128		0.20 872	9.92 968		16
		20		29			8	
45	9.72 116		9.79 156		0.20 844	9.92 960		15
		21		28			8	
46	9.72 137		9.79 185		0.20 815	9.92 952		14
		20		28			8	
47	9.72 157		9.79 213		0.20 787	9.92 944		13
		20		28			8	
48	9.72 177		9.79 241		0.20 759	9.92 936		12
		21		28			7	
49	9.72 198		9.79 269		0.20 731	9.92 929	8	11
		20		28				
50	9.72 218		9.79 297		0.20 703	9.92 921		10
		20		29			8	
51	9.72 238		9.79 326		0.20 674	9.92 913		9
		21		28			8	
52	9.72 259		9.79 354		0.20 646	9.92 905		8
		20		28			8	
53	9.72 279		9.79 382		0.20 618	9.92 897		7
		20		28			8	
54	9.72 299		9.79 410		0.20 590	9.92 889		6
		21		28			8	
55	9.72 320		9.79 438		0.20 562	9.92 881		5
		20		28			7	
56	9.72 340		9.79 466		0.20 534	9.92 874	8	4
		20		29				
57	9.72 360		9.79 495		0.20 505	9.92 866		3
		21		28			8	
58	9.72 381		9.79 523		0.20 477	9.92 858		2
		20		28			8	
59	9.72 401		9.79 551		0.20 449	9.92 850		1
		20		28			8	
60	9.72 421		9.79 579		0.20 421	9.92 842		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P

	29	28
1	0.5	0.5
2	1.0	0.9
3	1.4	1.4
4	1.9	1.9
5	2.4	2.3
6	2.9	2.8
7	3.4	3.3
8	3.9	3.7
9	4.4	4.2
10	4.8	4.7
20	9.7	9.3
30	14.5	14.0
40	19.3	18.7
50	24.2	23.3

	21	20
1	0.4	0.3
2	0.7	0.7
3	1.0	1.0
4	1.4	1.3
5	1.8	1.7
6	2.1	2.0
7	2.4	2.3
8	2.8	2.7
9	3.2	3.0
10	3.5	3.3
20	7.0	6.7
30	10.5	10.0
40	14.0	13.3
50	17.5	16.7

	8	7
1	0.1	0.1
2	0.3	0.2
3	0.4	0.4
4	0.5	0.5
5	0.7	0.6
6	0.8	0.7
7	0.9	0.8
8	1.1	0.9
9	1.2	1.0
10	1.3	1.2
20	2.7	2.3
30	4.0	3.5
40	5.3	4.7
50	6.7	5.8

c	8/30	8/29	8/28
1	1.9	1.8	1.8
2	5.6	5.4	5.2
3	9.4	9.1	8.8
4	13.1	12.7	12.2
5	16.9	16.3	15.8
6	20.6	19.9	19.2
7	24.4	23.6	22.8
8	28.1	27.2	26.2

P P

*148° 238° *328°

32°

*122° 212° *302°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.72 421	20	9.79 579	28	0.20 421	9.92 842	8	60
1	9.72 441	20	9.79 607	28	0.20 393	9.92 834	8	59
2	9.72 461	21	9.79 635	28	0.20 365	9.92 826	8	58
3	9.72 482	20	9.79 663	28	0.20 337	9.92 818	8	57
4	9.72 502	20	9.79 691	28	0.20 309	9.92 810	7	56
5	9.72 522	20	9.79 719	28	0.20 281	9.92 803	8	55
6	9.72 542	20	9.79 747	29	0.20 253	9.92 795	8	54
7	9.72 562	20	9.79 776	28	0.20 224	9.92 787	8	53
8	9.72 582	20	9.79 804	28	0.20 196	9.92 779	8	52
9	9.72 602	20	9.79 832	28	0.20 168	9.92 771	8	51
10	9.72 622	21	9.79 860	28	0.20 140	9.92 763	8	50
11	9.72 643	20	9.79 888	28	0.20 112	9.92 755	8	49
12	9.72 663	20	9.79 916	28	0.20 084	9.92 747	8	48
13	9.72 683	20	9.79 944	28	0.20 056	9.92 739	8	47
14	9.72 703	20	9.79 972	28	0.20 028	9.92 731	8	46
15	9.72 723	20	9.80 000	28	0.20 000	9.92 723	8	45
16	9.72 743	20	9.80 028	28	0.19 972	9.92 715	8	44
17	9.72 763	20	9.80 056	28	0.19 944	9.92 707	8	43
18	9.72 783	20	9.80 084	28	0.19 916	9.92 699	8	42
19	9.72 803	20	9.80 112	28	0.19 888	9.92 691	8	41
20	9.72 823	20	9.80 140	28	0.19 860	9.92 683	8	40
21	9.72 843	20	9 80 168	27	0.19 832	9.92 675	8	39
22	9.72 863	20	9.80 195	28	0.19 805	9.92 667	8	38
23	9.72 883	19	9.80 223	28	0.19 777	9.92 659	8	37
24	9.72 902	20	9.80 251	28	0.19 749	9.92 651	8	36
25	9.72 922	20	9.80 279	28	0.19 721	9.92 643	8	35
26	9.72 942	20	9.80 307	28	0.19 693	9.92 635	8	34
27	9.72 962	20	9.80 335	28	0.19 665	9.92 627	8	33
28	9.72 982	20	9.80 363	28	0.19 637	9.92 619	8	32
29	9.73 002	20	9.80 391	28	0.19 609	9.92 611	8	31
30	9.73 022	19	9.80 419	28	0.19 581	9.92 603	8	30
31	9.73 041	20	9.80 447	27	0.19 553	9.92 595	8	29
32	9.73 061	20	9.80 474	28	0.19 526	9.92 587	8	28
33	9.73 081	20	9.80 502	28	0.19 498	9.92 579	8	27
34	9.73 101	20	9.80 530	28	0.19 470	9.92 571	8	26
35	9.73 121	19	9.80 558	28	0.19 442	9.92 563	8	25
36	9.73 140	20	9.80 586	28	0.19 414	9.92 555	9	24
37	9.73 160	20	9.80 614	28	0.19 386	9.92 546	8	23
38	9.73 180	20	9.80 642	27	0.19 358	9.92 538	8	22
39	9.73 200	19	9.80 669	28	0.19 331	9.92 530	8	21
40	9.73 219	20	9.80 697	28	0.19 303	9.92 522	8	20
41	9.73 239	20	9.80 725	28	0.19 275	9.92 514	8	19
42	9.73 259	19	9.80 753	28	0.19 247	9.92 506	8	18
43	9.73 278	20	9.80 781	27	0.19 219	9.92 498	8	17
44	9.73 298	20	9.80 808	28	0.19 192	9.92 490	8	16
45	9.73 318	19	9.80 836	28	0.19 164	9.92 482	9	15
46	9.73 337	20	9.80 864	28	0.19 136	9.92 473	8	14
47	9.73 357	20	9.80 892	27	0.19 108	9.92 465	8	13
48	9.73 377	19	9.80 919	28	0.19 081	9.92 457	8	12
49	9.73 396	20	9.80 947	28	0.19 053	9.92 449	8	11
50	9.73 416	19	9.80 975	28	0.19 025	9.92 441	8	10
51	9.73 435	20	9.81 003	27	0.18 997	9.92 433	8	9
52	9.73 455	19	9.81 030	28	0.18 970	9.92 425	9	8
53	9.73 474	20	9.81 058	28	0.18 942	9.92 416	8	7
54	9.73 494	19	9.81 086	27	0.18 914	9.92 408	8	6
55	9.73 513	20	9.81 113	28	0.18 887	9.92 400	8	5
56	9.73 533	19	9.81 141	28	0.18 859	9.92 392	8	4
57	9.73 552	20	9.81 169	27	0.18 831	9.92 384	8	3
58	9.73 572	19	9.81 196	28	0.18 804	9.92 376	9	2
59	9.73 591	20	9.81 224	28	0.18 776	9.92 367	8	1
60	9.73 611		9.81 252		0.18 748	9.92 359		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P		
	29	28	27
1	0.5	0.5	0.4
2	1.0	0.9	0.9
3	1.4	1.4	1.4
4	1.9	1.9	1.8
5	2.4	2.3	2.2
6	2.9	2.8	2.7
7	3.4	3.3	3.2
8	3.9	3.7	3.6
9	4.4	4.2	4.0
10	4.8	4.7	4.5
20	9.7	9.3	9.0
30	14.5	14.0	13.5
40	19.3	18.7	18.0
50	24.2	23.3	22.5

	21	20	19
1	0.4	0.3	0.3
2	0.7	0.7	0.6
3	1.0	1.0	1.0
4	1.4	1.3	1.3
5	1.8	1.7	1.6
6	2.1	2.0	1.9
7	2.4	2.3	2.2
8	2.8	2.7	2.5
9	3.2	3.0	2.8
10	3.5	3.3	3.2
20	7.0	6.7	6.3
30	10.5	10.0	9.5
40	14.0	13.3	12.7
50	17.5	16.7	15.8

	9	8	7
1	0.2	0.1	0.1
2	0.3	0.3	0.2
3	0.4	0.4	0.4
4	0.6	0.5	0.5
5	0.8	0.7	0.6
6	0.9	0.8	0.7
7	1.0	0.9	0.8
8	1.2	1.1	0.9
9	1.4	1.2	1.0
10	1.5	1.3	1.2
20	3.0	2.7	2.3
30	4.5	4.0	3.5
40	6.0	5.3	4.7
50	7.5	6.7	5.8

	8/29	8/28	7/28
0			
1	1.8	1.8	2.0
2	5.4	5.2	6.0
3	9.1	8.8	10.0
4	12.7	12.2	14.0
5	16.3	15.8	18.0
6	19.9	19.2	22.0
7	23.6	22.8	26.0
8	27.2	26.2	—

P	P

*147° 237° *327°

57°

33°

*123° 213° *303°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.73 611		9.81 252		0.18 748	9.92 359		60
		19		27			8	
1	9.73 630		9.81 279		0.18 721	9.92 351		59
		20		28			8	
2	9.73 650		9.81 307		0.18 693	9.92 343		58
		19		28			8	
3	9.73 669		9.81 335		0.18 665	9.92 335		57
		20		27			9	
4	9.73 689		9.81 362		0.18 638	9.92 326		56
		19		28			8	
5	9.73 708		9.81 390		0.18 610	9.92 318		55
		19		28			8	
6	9.73 727		9.81 418		0.18 582	9.92 310		54
		20		27			8	
7	9.73 747		9.81 445		0.18 555	9.92 302		53
		19		28			9	
8	9.73 766		9.81 473		0.18 527	9.92 293		52
		19		27			8	
9	9.73 785		9.81 500		0.18 500	9.92 285		51
		20		28			8	
10	9.73 805		9.81 528		0.18 472	9.92 277		50
		19		28			8	
11	9.73 824		9.81 556		0.18 444	9.92 269		49
		19		27			9	
12	9.73 843		9.81 583		0.18 417	9.92 260		48
		19		28			8	
13	9.73 863		9.81 611		0.18 389	9.92 252		47
		19		27			8	
14	9.73 882		9.81 638		0.18 362	9.92 244		46
		19		28			9	
15	9.73 901		9.81 666		0.18 334	9.92 235		45
		20		27			8	
16	9.73 921		9.81 693		0.18 307	9.92 227		44
		19		28			8	
17	9.73 940		9.81 721		0.18 279	9.92 219		43
		19		27			8	
18	9.73 959		9.81 748		0.18 252	9.92 211		42
		19		28			9	
19	9.73 978		9.81 776		0.18 224	9.92 202		41
		19		27			8	
20	9.73 997		9.81 803		0.18 197	9.92 194		40
		20		28			8	
21	9.74 017		9.81 831		0.18 169	9.92 186		39
		19		27			9	
22	9.74 036		9.81 858		0.18 142	9.92 177		38
		19		28			8	
23	9.74 055		9.81 886		0.18 114	9.92 169		37
		19		27			8	
24	9.74 074		9.81 913		0.18 087	9.92 161		36
		19		28			9	
25	9.74 093		9.81 941		0.18 059	9.92 152		35
		20		27			8	
26	9.74 113		9.81 968		0.18 032	9.92 144		34
		19		28			8	
27	9.74 132		9.81 996		0.18 004	9.92 136		33
		19		27			9	
28	9.74 151		9.82 023		0.17 977	9.92 127		32
		19		28			8	
29	9.74 170		9.82 051		0.17 949	9.92 119		31
		19		27			8	
30	9.74 189		9.82 078		0.17 922	9.92 111		30
		19		28			9	
31	9.74 208		9.82 106		0.17 894	9.92 102		29
		19		27			8	
32	9.74 227		9.82 133		0.17 867	9.92 094		28
		19		28			8	
33	9.74 246		9.82 161		0.17 839	9.92 086		27
		19		27			9	
34	9.74 265		9.82 188		0.17 812	9.92 077		26
		19		27			8	
35	9.74 284		9.82 215		0.17 785	9.92 069		25
		19		28			9	
36	9.74 303		9.82 243		0.17 757	9.92 060		24
		19		27			8	
37	9.74 322		9.82 270		0.17 730	9.92 052		23
		19		28			8	
38	9.74 341		9.82 298		0.17 702	9.92 044		22
		19		27			9	
39	9.74 360		9.82 325		0.17 675	9.92 035		21
		19		27			8	
40	9.74 379		9.82 352		0.17 648	9.92 027		20
		19		28			9	
41	9.74 398		9.82 380		0.17 620	9.92 018		19
		19		27			8	
42	9.74 417		9.82 407		0.17 593	9.92 010		18
		19		28			8	
43	9.74 436		9.82 435		0.17 565	9.92 002		17
		19		27			9	
44	9.74 455		9.82 462		0.17 538	9.91 993		16
		19		27			8	
45	9.74 474		9.82 489		0.17 511	9.91 985		15
		19		28			9	
46	9.74 493		9.82 517		0.17 483	9.91 976		14
		19		27			8	
47	9.74 512		9.82 544		0.17 456	9.91 968		13
		19		27			9	
48	9.74 531		9.82 571		0.17 429	9.91 959		12
		18		28			8	
49	9.74 549		9.82 599		0.17 401	9.91 951		11
		19		27			9	
50	9.74 568		9.82 626		0.17 374	9.91 942		10
		19		27			8	
51	9.74 587		9.82 653		0.17 347	9.91 934		9
		19		28			9	
52	9.74 606		9.82 681		0.17 319	9.91 925		8
		19		27			8	
53	9.74 625		9.82 708		0.17 292	9.91 917		7
		19		27			9	
54	9.74 644		9.82 735		0.17 265	9.91 908		6
		18		27			8	
55	9.74 662		9.82 762		0.17 238	9.91 900		5
		19		28			9	
56	9.74 681		9.82 790		0.17 210	9.91 891		4
		19		27			8	
57	9.74 700		9.82 817		0.17 183	9.91 883		3
		19		27			9	
58	9.74 719		9.82 844		0.17 156	9.91 874		2
		18		27			8	
59	9.74 737		9.82 871		0.17 129	9.91 866		1
		19		28			9	
60	9.74 756		9.82 899		0.17 101	9.91 857		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

*146° 236° *326°

56°

P P

	28	27
1	0.5	0.4
2	0.9	0.9
3	1.4	1.4
4	1.9	1.8
5	2.3	2.2
6	2.8	2.7
7	3.3	3.2
8	3.7	3.6
9	4.2	4.0
10	4.7	4.5
20	9.3	9.0
30	14.0	13.5
40	18.7	18.0
50	23.3	22.5

	20	19	18
1	0.3	0.3	0.3
2	0.7	0.6	0.6
3	1.0	1.0	0.9
4	1.3	1.3	1.2
5	1.7	1.6	1.5
6	2.0	1.9	1.8
7	2.3	2.2	2.1
8	2.7	2.5	2.4
9	3.0	2.8	2.7
10	3.3	3.2	3.0
20	6.7	6.3	6.0
30	10.0	9.5	9.0
40	13.3	12.7	12.0
50	16.7	15.8	15.0

	9	8
1	0.2	0.1
2	0.3	0.3
3	0.4	0.4
4	0.6	0.5
5	0.8	0.7
6	0.9	0.8
7	1.0	0.9
8	1.2	1.1
9	1.4	1.2
10	1.5	1.3
20	3.0	2.7
30	4.5	4.0
40	6.0	5.3
50	7.5	6.7

	9/28	9/27	8/27
0			
1	1.6	1.5	1.7
2	4.7	4.5	5.1
3	7.8	7.5	8.4
4	10.9	10.5	11.8
5	14.0	13.5	15.2
6	17.1	16.5	18.6
7	20.2	19.5	21.9
8	23.3	22.5	25.3
9	26.4	25.5	—

34°

*124° 214° *304°

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.74 756		9.82 899		0.17 101	9.91 857		60
		19		27			8	
1	9.74 775		9.82 926		0.17 074	9.91 849		59
		19		27			9	
2	9.74 794		9.82 953		0.17 047	9.91 840		58
		18		27			9	
3	9.74 812		9.82 980		0.17 020	9.91 832		57
		19		28			9	
4	9.74 831		9.83 008		0.16 992	9.91 823		56
		19		27			8	
5	9.74 850		9.83 035		0.16 965	9.91 815		55
		18		27			9	
6	9.74 868		9.83 062		0.16 938	9.91 806		54
		19		27			8	
7	9.74 887		9.83 089		0.16 911	9.91 798		53
		19		28			9	
8	9.74 906		9.83 117		0.16 883	9.91 789		52
		18		27			8	
9	9.74 924		9.83 144		0.16 856	9.91 781		51
		19		27			9	
10	9.74 943		9.83 171		0.16 829	9.91 772		50
		18		27			9	
11	9.74 961		9.83 198		0.16 802	9.91 763		49
		19		27			8	
12	9.74 980		9.83 225		0.16 775	9.91 755		48
		19		27			9	
13	9.74 999		9.83 252		0.16 748	9.91 746		47
		18		28			8	
14	9.75 017		9.83 280		0.16 720	9.91 738		46
		19		27			9	
15	9.75 036		9.83 307		0.16 693	9.91 729		45
		18		27			9	
16	9.75 054		9.83 334		0.16 666	9.91 720		44
		19		27			9	
17	9.75 073		9.83 361		0.16 639	9.91 712		43
		18		27			8	
18	9.75 091		9.83 388		0.16 612	9.91 703		42
		19		27			9	
19	9.75 110		9.83 415		0.16 585	9.91 695		41
		18		27			8	
20	9.75 128		9.83 442		0.16 558	9.91 686		40
		19		28			9	
21	9.75 147		9.83 470		0.16 530	9.91 677		39
		18		27			9	
22	9.75 165		9.83 497		0.16 503	9.91 669		38
		19		27			9	
23	9.75 184		9.83 524		0.16 476	9.91 660		37
		18		27			9	
24	9.75 202		9.83 551		0.16 449	9.91 651		36
		19		27			8	
25	9.75 221		9.83 578		0.16 422	9.91 643		35
		18		27			9	
26	9.75 239		9.83 605		0.16 395	9.91 634		34
		19		27			9	
27	9.75 258		9.83 632		0.16 368	9.91 625		33
		18		27			8	
28	9.75 276		9.83 659		0.16 341	9.91 617		32
		18		27			9	
29	9.75 294		9.83 686		0.16 314	9.91 608		31
		19		27			9	
30	9.75 313		9.83 713		0.16 287	9.91 599		30
		18		27			8	
31	9.75 331		9.83 740		0.16 260	9.91 591		29
		19		28			9	
32	9.75 350		9.83 768		0.16 232	9.91 582		28
		18		27			9	
33	9.75 368		9.83 795		0.16 205	9.91 573		27
		18		27			9	
34	9.75 386		9.83 822		0.16 178	9.91 565		26
		19		27			8	
35	9.75 405		9.83 849		0.16 151	9.91 556		25
		18		27			9	
36	9.75 423		9.83 876		0.16 124	9.91 547		24
		18		27			9	
37	9.75 441		9.83 903		0.16 097	9.91 538		23
		18		27			9	
38	9.75 459		9.83 930		0.16 070	9.91 530		22
		19		27			8	
39	9.75 478		9.83 957		0.16 043	9.91 521		21
		18		27			9	
40	9.75 496		9.83 984		0.16 016	9.91 512		20
		18		27			9	
41	9.75 514		9.84 011		0.15 989	9.91 504		19
		19		27			8	
42	9.75 533		9.84 038		0.15 962	9.91 495		18
		18		27			9	
43	9.75 551		9.84 065		0.15 935	9.91 486		17
		18		27			9	
44	9.75 569		9.84 092		0.15 908	9.91 477		16
		18		27			8	
45	9.75 587		9.84 119		0.15 881	9.91 469		15
		18		27			9	
46	9.75 605		9.84 146		0.15 854	9.91 460		14
		19		27			9	
47	9.75 624		9.84 173		0.15 827	9.91 451		13
		18		27			9	
48	9.75 642		9.84 200		0.15 800	9.91 442		12
		18		27			9	
49	9.75 660		9.84 227		0.15 773	9.91 433		11
		18		27			8	
50	9.75 678		9.84 254		0.15 746	9.91 425		10
		18		26			9	
51	9.75 696		9.84 280		0.15 720	9.91 416		9
		18		27			9	
52	9.75 714		9.84 307		0.15 693	9.91 407		8
		19		27			9	
53	9.75 733		9.84 334		0.15 666	9.91 398		7
		18		27			9	
54	9.75 751		9.84 361		0.15 639	9.91 389		6
		18		27			9	
55	9.75 769		9.84 388		0.15 612	9.91 381		5
		18		27			9	
56	9.75 787		9.84 415		0.15 585	9.91 372		4
		18		27			9	
57	9.75 805		9.84 442		0.15 558	9.91 363		3
		18		27			9	
58	9.75 823		9.84 469		0.15 531	9.91 354		2
		18		27			9	
59	9.75 841		9.84 496		0.15 504	9.91 345		1
		18		27			9	
60	9.75 859		9.84 523		0.15 477	9.91 336		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

*145° 235° *325°

55°

P P

	28	27	26
1	0.5	0.4	0.4
2	0.9	0.9	0.9
3	1.4	1.4	1.3
4	1.9	1.8	1.7
5	2.3	2.2	2.2
6	2.8	2.7	2.6
7	3.3	3.2	3.0
8	3.7	3.6	3.5
9	4.2	4.0	3.9
10	4.7	4.5	4.3
20	9.3	9.0	8.7
30	14.0	13.5	13.0
40	18.7	18.0	17.3
50	23.3	22.5	21.7

	19	18
1	0.3	0.3
2	0.6	0.6
3	1.0	0.9
4	1.3	1.2
5	1.6	1.5
6	1.9	1.8
7	2.2	2.1
8	2.5	2.4
9	2.8	2.7
10	3.2	3.0
20	6.3	6.0
30	9.5	9.0
40	12.7	12.0
50	15.8	15.0

	9	8
1	0.2	0.1
2	0.3	0.3
3	0.4	0.4
4	0.6	0.5
5	0.8	0.7
6	0.9	0.8
7	1.0	0.9
8	1.2	1.1
9	1.4	1.2
10	1.5	1.3
20	3.0	2.7
30	4.5	4.0
40	6.0	5.3
50	7.5	6.7

	$\frac{9}{28}$	$\frac{8}{28}$	$\frac{8}{27}$
0			
1	1.6	1.8	1.7
2	4.7	5.2	5.1
3	7.8	8.8	8.4
4	10.9	12.2	11.8
5	14.0	15.8	15.2
6	17.1	19.2	18.6
7	20.2	22.8	21.9
8	23.3	26.2	25.3
9	26.4	—	—

35°

*125° 215° *305°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d		P P
0	9.75 859	18	9.84 523	27	0.15 477	9.91 336	8	60	
1	9.75 877	18	9.84 550	26	0.15 450	9.91 328	9	59	
2	9.75 895	18	9.84 576	27	0.15 424	9.91 319	9	58	
3	9.75 913	18	9.84 603	27	0.15 397	9.91 310	9	57	
4	9.75 931	18	9.84 630	27	0.15 370	9.91 301	9	56	
5	9.75 949	18	9.84 657	27	0.15 343	9.91 292	9	55	
6	9.75 967	18	9.84 684	27	0.15 316	9.91 283	9	54	
7	9.75 985	18	9.84 711	27	0.15 289	9.91 274	8	53	
8	9.76 003	18	9.84 738	26	0.15 262	9.91 266	9	52	
9	9.76 021	18	9.84 764	27	0.15 236	9.91 257	9	51	
10	9.76 039	18	9.84 791	27	0.15 209	9.91 248	9	50	
11	9.76 057	18	9.84 818	27	0.15 182	9.91 239	9	49	
12	9.76 075	18	9.84 845	27	0.15 155	9.91 230	9	48	
13	9.76 093	18	9.84 872	27	0.15 128	9.91 221	9	47	
14	9.76 111	18	9.84 899	26	0.15 101	9.91 212	9	46	
15	9.76 129	17	9.84 925	27	0.15 075	9.91 203	9	45	
16	9.76 146	18	9.84 952	27	0.15 048	9.91 194	9	44	
17	9.76 164	18	9.84 979	27	0.15 021	9.91 185	9	43	
18	9.76 182	18	9.85 006	27	0.14 994	9.91 176	9	42	
19	9.76 200	18	9.85 033	26	0.14 967	9.91 167	9	41	
20	9.76 218	18	9.85 059	27	0.14 941	9.91 158	9	40	
21	9.76 236	17	9.85 086	27	0.14 914	9.91 149	8	39	
22	9.76 253	18	9.85 113	27	0.14 887	9.91 141	9	38	
23	9.76 271	18	9.85 140	26	0.14 860	9.91 132	9	37	
24	9.76 289	18	9.85 166	27	0.14 834	9.91 123	9	36	
25	9.76 307	17	9.85 193	27	0.14 807	9.91 114	9	35	
26	9.76 324	18	9.85 220	27	0.14 780	9.91 105	9	34	
27	9.76 342	18	9.85 247	26	0.14 753	9.91 096	9	33	
28	9.76 360	18	9.85 273	27	0.14 727	9.91 087	9	32	
29	9.76 378	17	9.85 300	27	0.14 700	9.91 078	9	31	
30	9.76 395	18	9.85 327	27	0.14 673	9.91 069	9	30	
31	9.76 413	18	9.85 354	26	0.14 646	9.91 060	9	29	
32	9.76 431	17	9.85 380	27	0.14 620	9.91 051	9	28	
33	9.76 448	18	9.85 407	27	0.14 593	9.91 042	9	27	
34	9.76 466	18	9.85 434	26	0.14 566	9.91 033	10	26	
35	9.76 484	17	9.85 460	27	0.14 540	9.91 023	9	25	
36	9.76 501	18	9.85 487	27	0.14 513	9.91 014	9	24	
37	9.76 519	18	9.85 514	26	0.14 486	9.91 005	9	23	
38	9.76 537	17	9.85 540	27	0.14 460	9.90 996	9	22	
39	9.76 554	18	9.85 567	27	0.14 433	9.90 987	9	21	
40	9.76 572	18	9.85 594	26	0.14 406	9.90 978	9	20	
41	9.76 590	17	9.85 620	27	0.14 380	9.90 969	9	19	
42	9.76 607	18	9.85 647	27	0.14 353	9.90 960	9	18	
43	9.76 625	17	9.85 674	26	0.14 326	9.90 951	9	17	
44	9.76 642	18	9.85 700	27	0.14 300	9.90 942	9	16	
45	9.76 660	17	9.85 727	27	0.14 273	9.90 933	9	15	
46	9.76 677	18	9.85 754	26	0.14 246	9.90 924	9	14	
47	9.76 695	17	9.85 780	27	0.14 220	9.90 915	9	13	
48	9.76 712	18	9.85 807	27	0.14 193	9.90 906	10	12	
49	9.76 730	17	9.85 834	26	0.14 166	9.90 896	9	11	
50	9.76 747	18	9.85 860	27	0.14 140	9.90 887	9	10	
51	9.76 765	17	9.85 887	26	0.14 113	9.90 878	9	9	
52	9.76 782	18	9.85 913	27	0.14 087	9.90 869	9	8	
53	9.76 800	17	9.85 940	27	0.14 060	9.90 860	9	7	
54	9.76 817	18	9.85 967	26	0.14 033	9.90 851	9	6	
55	9.76 835	17	9.85 993	27	0.14 007	9.90 842	10	5	
56	9.76 852	18	9.86 020	26	0.13 980	9.90 832	9	4	
57	9.76 870	17	9.86 046	27	0.13 954	9.90 823	9	3	
58	9.76 887	17	9.86 073	27	0.13 927	9.90 814	9	2	
59	9.76 904	18	9.86 100	26	0.13 900	9.90 805	9	1	
60	9.76 922		9.86 126		0.13 874	9.90 796		0	
	L Cos	d	L Cot	c d	L Tan	L Sin	d		P P

	27	26	18
1	0.4	0.4	0.3
2	0.9	0.9	0.6
3	1.4	1.3	0.9
4	1.8	1.7	1.2
5	2.2	2.2	1.5
6	2.7	2.6	1.8
7	3.2	3.0	2.1
8	3.6	3.5	2.4
9	4.0	3.9	2.7
10	4.5	4.3	3.0
20	9.0	8.7	6.0
30	13.5	13.0	9.0
40	18.0	17.3	12.0
50	22.5	21.7	15.0

	17	10	9	8
1	0.3	0.2	0.2	0.1
2	0.6	0.3	0.3	0.3
3	0.8	0.5	0.4	0.4
4	1.1	0.7	0.6	0.5
5	1.4	0.8	0.8	0.7
6	1.7	1.0	0.9	0.8
7	2.0	1.2	1.0	0.9
8	2.3	1.3	1.2	1.1
9	2.6	1.5	1.4	1.2
10	2.8	1.7	1.5	1.3
20	5.7	3.3	3.0	2.7
30	8.5	5.0	4.5	4.0
40	11.3	6.7	6.0	5.3
50	14.2	8.3	7.5	6.7

	10/27	10/26
0	1.4	1.3
1	4.1	3.9
2	6.8	6.5
3	9.4	9.1
4	12.2	11.7
5	14.8	14.3
6	17.6	16.9
7	20.2	19.5
8	22.9	22.1
9	25.6	24.7
10		

	9/27	9/26
0	1.5	1.4
1	4.5	4.3
2	7.5	7.2
3	10.5	10.1
4	13.5	13.0
5	16.5	15.9
6	19.5	18.8
7	22.5	21.7
8	25.5	24.6
9		

*144° 234° *324°

54°

36°

*126° 216° *306°

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.76 922	17	9.86 126	27	0.13 874	9.90 796	9	60
1	9.76 939	18	9.86 153	26	0.13 847	9.90 787	10	59
2	9.76 957	17	9.86 179	27	0.13 821	9.90 777	9	58
3	9.76 974	17	9.86 206	26	0.13 794	9.90 768	9	57
4	9.76 991	18	9.86 232	27	0.13 768	9.90 759	9	56
5	9.77 009	17	9.86 259	26	0.13 741	9.90 750	9	55
6	9.77 026	17	9.86 285	27	0.13 715	9.90 741	10	54
7	9.77 043	18	9.86 312	26	0.13 688	9.90 731	9	53
8	9.77 061	17	9.86 338	27	0.13 662	9.90 722	9	52
9	9.77 078	17	9.86 365	27	0.13 635	9.90 713	9	51
10	9.77 095	17	9.86 392	26	0.13 608	9.90 704	10	50
11	9.77 112	18	9.86 418	27	0.13 582	9.90 694	9	49
12	9.77 130	17	9.86 445	26	0.13 555	9.90 685	9	48
13	9.77 147	17	9.86 471	27	0.13 529	9.90 676	9	47
14	9.77 164	17	9.86 498	26	0.13 502	9.90 667	9	46
15	9.77 181	18	9.86 524	27	0.13 476	9.90 657	10	45
16	9.77 199	17	9.86 551	26	0.13 449	9.90 648	9	44
17	9.77 216	17	9.86 577	26	0.13 423	9.90 639	9	43
18	9.77 233	17	9.86 603	27	0.13 397	9.90 630	9	42
19	9.77 250	18	9.86 630	26	0.13 370	9.90 620	10	41
20	9.77 268	17	9.86 656	27	0.13 344	9.90 611	9	40
21	9.77 285	17	9.86 683	26	0.13 317	9.90 602	9	39
22	9.77 302	17	9.86 709	27	0.13 291	9.90 592	10	38
23	9.77 319	17	9.86 736	26	0.13 264	9.90 583	9	37
24	9.77 336	17	9.86 762	27	0.13 238	9.90 574	9	36
25	9.77 353	17	9.86 789	26	0.13 211	9.90 565	9	35
26	9.77 370	17	9.86 815	27	0.13 185	9.90 555	10	34
27	9.77 387	18	9.86 842	26	0.13 158	9.90 546	9	33
28	9.77 405	17	9.86 868	26	0.13 132	9.90 537	9	32
29	9.77 422	17	9.86 894	27	0.13 106	9.90 527	10	31
30	9.77 439	17	9.86 921	26	0.13 079	9.90 518	9	30
31	9.77 456	17	9.86 947	27	0.13 053	9.90 509	9	29
32	9.77 473	17	9.86 974	26	0.13 026	9.90 499	10	28
33	9.77 490	17	9.87 000	27	0.13 000	9.90 490	9	27
34	9.77 507	17	9.87 027	26	0.12 973	9.90 480	10	26
35	9.77 524	17	9.87 053	26	0.12 947	9.90 471	9	25
36	9.77 541	17	9.87 079	27	0.12 921	9.90 462	9	24
37	9.77 558	17	9.87 106	26	0.12 894	9.90 452	10	23
38	9.77 575	17	9.87 132	26	0.12 868	9.90 443	9	22
39	9.77 592	17	9.87 158	27	0.12 842	9.90 434	9	21
40	9.77 609	17	9.87 185	26	0.12 815	9.90 424	10	20
41	9.77 626	17	9.87 211	27	0.12 789	9.90 415	9	19
42	9.77 643	17	9.87 238	26	0.12 762	9.90 405	10	18
43	9.77 660	17	9.87 264	26	0.12 736	9.90 396	9	17
44	9.77 677	17	9.87 290	27	0.12 710	9.90 386	10	16
45	9.77 694	17	9.87 317	26	0.12 683	9.90 377	9	15
46	9.77 711	17	9.87 343	26	0.12 657	9.90 368	9	14
47	9.77 728	16	9.87 369	27	0.12 631	9.90 358	10	13
48	9.77 744	17	9.87 396	26	0.12 604	9.90 349	9	12
49	9.77 761	17	9.87 422	26	0.12 578	9.90 339	10	11
50	9.77 778	17	9.87 448	27	0.12 552	9.90 330	9	10
51	9.77 795	17	9.87 475	26	0.12 525	9.90 320	10	9
52	9.77 812	17	9.87 501	26	0.12 499	9.90 311	9	8
53	9.77 829	17	9.87 527	27	0.12 473	9.90 301	10	7
54	9.77 846	16	9.87 554	26	0.12 446	9.90 292	9	6
55	9.77 862	17	9.87 580	26	0.12 420	9.90 282	10	5
56	9.77 879	17	9.87 606	27	0.12 394	9.90 273	9	4
57	9.77 896	17	9.87 633	26	0.12 367	9.90 263	10	3
58	9.77 913	17	9.87 659	26	0.12 341	9.90 254	9	2
59	9.77 930	16	9.87 685	26	0.12 315	9.90 244	10	1
60	9.77 946		9.87 711		0.12 289	9.90 235	9	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

*113° 233° *323°

53°

P P

	27	26
1	0.4	0.4
2	0.9	0.9
3	1.4	1.3
4	1.8	1.7
5	2.2	2.2
6	2.7	2.6
7	3.2	3.0
8	3.6	3.5
9	4.0	3.9
10	4.5	4.3
20	9.0	8.7
30	13.5	13.0
40	18.0	17.3
50	22.5	21.7

	18	17	16
1	0.3	0.3	0.3
2	0.6	0.6	0.5
3	0.9	0.8	0.8
4	1.2	1.1	1.1
5	1.5	1.4	1.3
6	1.8	1.7	1.6
7	2.1	2.0	1.9
8	2.4	2.3	2.1
9	2.7	2.6	2.4
10	3.0	2.8	2.7
20	6.0	5.7	5.3
30	9.0	8.5	8.0
40	12.0	11.3	10.7
50	15.0	14.2	13.3

	10	9
1	0.2	0.2
2	0.3	0.3
3	0.5	0.4
4	0.7	0.6
5	0.8	0.8
6	1.0	0.9
7	1.2	1.0
8	1.3	1.2
9	1.5	1.4
10	1.7	1.5
20	3.3	3.0
30	5.0	4.5
40	6.7	6.0
50	8.3	7.5

	$\frac{9}{27}$	$\frac{9}{26}$
0	1.5	1.4
1	4.5	4.3
2	7.5	7.2
3	10.5	10.1
4	13.5	13.0
5	16.5	15.9
6	19.5	18.8
7	22.5	21.7
8	25.5	24.6
9		

P P

37°

*127° 217° *307°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d		P P
0	9.77 946	17	9.87 711	27	0.12 289	9.90 235	10	60	
1	9.77 963	17	9.87 738	26	0.12 262	9.90 225	9	59	27 26
2	9.77 980	17	9.87 764	26	0.12 236	9.90 216	10	58	1 0.4 0.4
3	9.77 997	16	9.87 790	27	0.12 210	9.90 206	9	57	2 0.9 0.9
4	9.78 013	17	9.87 817	26	0.12 183	9.90 197	10	56	3 1.4 1.3
5	9.78 030	17	9.87 843	26	0.12 157	9.90 187	9	55	4 1.8 1.7
6	9.78 047	16	9.87 869	26	0.12 131	9.90 178	10	54	5 2.2 2.2
7	9.78 063	17	9.87 895	27	0.12 105	9.90 168	9	53	6 2.7 2.6
8	9.78 080	17	9.87 922	26	0.12 078	9.90 159	10	52	7 3.2 3.0
9	9.78 097	16	9.87 948	26	0.12 052	9.90 149	10	51	8 3.6 3.5
10	9.78 113	17	9.87 974	26	0.12 026	9.90 139	9	50	9 4.0 3.9
11	9.78 130	17	9.88 000	27	0.12 000	9.90 130	10	49	10 4.5 4.3
12	9.78 147	16	9.88 027	26	0.11 973	9.90 120	9	48	20 9.0 8.7
13	9.78 163	17	9.88 053	26	0.11 947	9.90 111	10	47	30 13.5 13.0
14	9.78 180	17	9.88 079	26	0.11 921	9.90 101	10	46	40 18.0 17.3
15	9.78 197	16	9.88 105	26	0.11 895	9.90 091	9	45	50 22.5 21.7
16	9.78 213	17	9.88 131	27	0.11 869	9.90 082	10	44	
17	9.78 230	16	9.88 158	26	0.11 842	9.90 072	9	43	17 16
18	9.78 246	17	9.88 184	26	0.11 816	9.90 063	10	42	1 0.3 0.3
19	9.78 263	17	9.88 210	26	0.11 790	9.90 053	10	41	2 0.6 0.5
20	9.78 280	16	9.88 236	26	0.11 764	9.90 043	9	40	3 0.8 0.8
21	9.78 296	17	9.88 262	27	0.11 738	9.90 034	10	39	4 1.1 1.1
22	9.78 313	16	9.88 289	26	0.11 711	9.90 024	10	38	5 1.4 1.3
23	9.78 329	17	9.88 315	26	0.11 685	9.90 014	9	37	6 1.7 1.6
24	9.78 346	16	9.88 341	26	0.11 659	9.90 005	10	36	7 2.0 1.9
25	9.78 362	17	9.88 367	26	0.11 633	9.89 995	10	35	8 2.3 2.1
26	9.78 379	16	9.88 393	27	0.11 607	9.89 985	9	34	9 2.6 2.4
27	9.78 395	17	9.88 420	26	0.11 580	9.89 976	10	33	10 2.8 2.7
28	9.78 412	16	9.88 446	26	0.11 554	9.89 966	10	32	20 5.7 5.3
29	9.78 428	17	9.88 472	26	0.11 528	9.89 956	9	31	30 8.5 8.0
30	9.78 445	16	9.88 498	26	0.11 502	9.89 947	10	30	40 11.3 10.7
31	9.78 461	17	9.88 524	26	0.11 476	9.89 937	10	29	50 14.2 13.3
32	9.78 478	16	9.88 550	27	0.11 450	9.89 927	9	28	
33	9.78 494	16	9.88 577	26	0.11 423	9.89 918	10	27	10 9
34	9.78 510	17	9.88 603	26	0.11 397	9.89 908	10	26	1 0.2 0.2
35	9.78 527	16	9.88 629	26	0.11 371	9.89 898	10	25	2 0.3 0.3
36	9.78 543	17	9.88 655	26	0.11 345	9.89 888	9	24	3 0.5 0.4
37	9.78 560	16	9.88 681	26	0.11 319	9.89 879	10	23	4 0.7 0.6
38	9.78 576	16	9.88 707	26	0.11 293	9.89 869	10	22	5 0.8 0.8
39	9.78 592	17	9.88 733	26	0.11 267	9.89 859	10	21	6 1.0 0.9
40	9.78 609	16	9.88 759	27	0.11 241	9.89 849	9	20	7 1.2 1.0
41	9.78 625	17	9.88 786	26	0.11 214	9.89 840	10	19	8 1.3 1.2
42	9.78 642	16	9.88 812	26	0.11 188	9.89 830	10	18	9 1.5 1.4
43	9.78 658	16	9.88 838	26	0.11 162	9.89 820	10	17	10 1.7 1.5
44	9.78 674	17	9.88 864	26	0.11 136	9.89 810	10	16	20 3.3 3.0
45	9.78 691	16	9.88 890	26	0.11 110	9.89 801	9	15	30 5.0 4.5
46	9.78 707	16	9.88 916	26	0.11 084	9.89 791	10	14	40 6.7 6.0
47	9.78 723	16	9.88 942	26	0.11 058	9.89 781	10	13	50 8.3 7.5
48	9.78 739	17	9.88 968	26	0.11 032	9.89 771	10	12	
49	9.78 756	16	9.88 994	26	0.11 006	9.89 761	10	11	10 10
50	9.78 772	16	9.89 020	26	0.10 980	9.89 752	10	10	27 26
51	9.78 788	17	9.89 046	27	0.10 954	9.89 742	10	9	0 1.4 1.3
52	9.78 805	16	9.89 073	26	0.10 927	9.89 732	10	8	1 4.1 3.9
53	9.78 821	16	9.89 099	26	0.10 901	9.89 722	10	7	2 6.8 6.5
54	9.78 837	16	9.89 125	26	0.10 875	9.89 712	10	6	3 9.4 9.1
55	9.78 853	16	9.89 151	26	0.10 849	9.89 702	10	5	4 12.2 11.7
56	9.78 869	17	9.89 177	26	0.10 823	9.89 693	9	4	5 14.8 14.3
57	9.78 886	16	9.89 203	26	0.10 797	9.89 683	10	3	6 17.6 16.9
58	9.78 902	16	9.89 229	26	0.10 771	9.89 673	10	2	7 20.2 19.5
59	9.78 918	16	9.89 255	26	0.10 745	9.89 663	10	1	8 22.9 22.1
60	9.78 934		9.89 281		0.10 719	9.89 653		0	9 25.6 24.7
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′	10 25.6 24.7
	P P								

*142° 232° *322°

52°

38°

*128° 218° *308°

	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.78 934	16	9.89 281	26	0.10 719	9.89 653	10	60
1	9.78 950	17	9.89 307	26	0.10 693	9.89 643	10	59
2	9.78 967	16	9.89 333	26	0.10 667	9.89 633	9	58
3	9.78 983	16	9.89 359	26	0.10 641	9.89 624	10	57
4	9.78 999	16	9.89 385	26	0.10 615	9.89 614	10	56
5	9.79 015	16	9.89 411	26	0.10 589	9.89 604	10	55
6	9.79 031	16	9.89 437	26	0.10 563	9.89 594	10	54
7	9.79 047	16	9.89 463	26	0.10 537	9.89 584	10	53
8	9.79 063	16	9.89 489	26	0.10 511	9.89 574	10	52
9	9.79 079	16	9.89 515	26	0.10 485	9.89 564	10	51
10	9.79 095	16	9.89 541	26	0.10 459	9.89 554	10	50
11	9.79 111	17	9.89 567	26	0.10 433	9.89 544	10	49
12	9.79 128	16	9.89 593	26	0.10 407	9.89 534	10	48
13	9.79 144	16	9.89 619	26	0.10 381	9.89 524	10	47
14	9.79 160	16	9.89 645	26	0.10 355	9.89 514	10	46
15	9.79 176	16	9.89 671	26	0.10 329	9.89 504	10	45
16	9.79 192	16	9.89 697	26	0.10 303	9.89 495	9	44
17	9.79 208	16	9.89 723	26	0.10 277	9.89 485	10	43
18	9.79 224	16	9.89 749	26	0.10 251	9.89 475	10	42
19	9.79 240	16	9.89 775	26	0.10 225	9.89 465	10	41
20	9.79 256	16	9.89 801	26	0.10 199	9.89 455	10	40
21	9.79 272	16	9.89 827	26	0.10 173	9.89 445	10	39
22	9.79 288	16	9.89 853	26	0.10 147	9.89 435	10	38
23	9.79 304	15	9.89 879	26	0.10 121	9.89 425	10	37
24	9.79 319	16	9.89 905	26	0.10 095	9.89 415	10	36
25	9.79 335	16	9.89 931	26	0.10 069	9.89 405	10	35
26	9.79 351	16	9.89 957	26	0.10 043	9.89 395	10	34
27	9.79 367	16	9.89 983	26	0.10 017	9.89 385	10	33
28	9.79 383	16	9.90 009	26	0.09 991	9.89 375	10	32
29	9.79 399	16	9.90 035	26	0.09 965	9.89 364	11	31
30	9.79 415	16	9.90 061	25	0.09 939	9.89 354	10	30
31	9.79 431	16	9.90 086	26	0.09 914	9.89 344	10	29
32	9.79 447	16	9.90 112	26	0.09 888	9.89 334	10	28
33	9.79 463	15	9.90 138	26	0.09 862	9.89 324	10	27
34	9.79 478	16	9.90 164	26	0.09 836	9.89 314	10	26
35	9.79 494	16	9.90 190	26	0.09 810	9.89 304	10	25
36	9.79 510	16	9.90 216	26	0.09 784	9.89 294	10	24
37	9.79 526	16	9.90 242	26	0.09 758	9.89 284	10	23
38	9.79 542	16	9.90 268	26	0.09 732	9.89 274	10	22
39	9.79 558	15	9.90 294	26	0.09 706	9.89 264	10	21
40	9.79 573	16	9.90 320	26	0.09 680	9.89 254	10	20
41	9.79 589	16	9.90 346	25	0.09 654	9.89 244	11	19
42	9.79 605	16	9.90 371	26	0.09 629	9.89 233	10	18
43	9.79 621	15	9.90 397	26	0.09 603	9.89 223	10	17
44	9.79 636	16	9.90 423	26	0.09 577	9.89 213	10	16
45	9.79 652	16	9.90 449	26	0.09 551	9.89 203	10	15
46	9.79 668	16	9.90 475	26	0.09 525	9.89 193	10	14
47	9.79 684	15	9.90 501	26	0.09 499	9.89 183	10	13
48	9.79 699	16	9.90 527	26	0.09 473	9.89 173	11	12
49	9.79 715	16	9.90 553	25	0.09 447	9.89 162	10	11
50	9.79 731	15	9.90 578	26	0.09 422	9.89 152	10	10
51	9.79 746	16	9.90 604	26	0.09 396	9.89 142	10	9
52	9.79 762	16	9.90 630	26	0.09 370	9.89 132	10	8
53	9.79 778	15	9.90 656	26	0.09 344	9.89 122	10	7
54	9.79 793	16	9.90 682	26	0.09 318	9.89 112	11	6
55	9.79 809	16	9.90 708	26	0.09 292	9.89 101	10	5
56	9.79 825	15	9.90 734	25	0.09 266	9.89 091	10	4
57	9.79 840	16	9.90 759	26	0.09 241	9.89 081	10	3
58	9.79 856	16	9.90 785	26	0.09 215	9.89 071	11	2
59	9.79 872	15	9.90 811	26	0.09 189	9.89 060	10	1
60	9.79 887		9.90 837		0.09 163	9.89 050		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

P	P	
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

	17	16	15
1	0.3	0.3	0.2
2	0.6	0.5	0.5
3	0.8	0.8	0.8
4	1.1	1.1	1.0
5	1.4	1.3	1.2
6	1.7	1.6	1.5
7	2.0	1.9	1.8
8	2.3	2.1	2.0
9	2.6	2.4	2.2
10	2.8	2.7	2.5
20	5.7	5.3	5.0
30	8.5	8.0	7.5
40	11.3	10.7	10.0
50	14.2	13.3	12.5

	11	10	9
1	0.2	0.2	0.2
2	0.4	0.3	0.3
3	0.6	0.5	0.4
4	0.7	0.7	0.6
5	0.9	0.8	0.8
6	1.1	1.0	0.9
7	1.3	1.2	1.0
8	1.5	1.3	1.2
9	1.6	1.5	1.4
10	1.8	1.7	1.5
20	3.7	3.3	3.0
30	5.5	5.0	4.5
40	7.3	6.7	6.0
50	9.2	8.3	7.5

	10/26	10/25	9/26
0	1.3	1.2	1.4
1	3.9	3.8	4.3
2	6.5	6.2	7.2
3	9.1	8.8	10.1
4	11.7	11.2	13.0
5	14.3	13.8	15.9
6	16.9	16.2	18.8
7	19.5	18.8	21.7
8	22.1	21.2	24.6
9	24.7	23.8	—
10			

P	P

*141° 231° *321°

51°

39°

*129° 219° *309°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.79 887		9.90 837		0.09 163	9.89 050		60
		16		26			10	
1	9.79 903		9.90 863		0.09 137	9.89 040		59
		15		26			10	
2	9.79 918		9.90 889		0.09 111	9.89 030		58
		16		25			10	
3	9.79 934		9.90 914	26	0.09 086	9.89 020	11	57
		16						
4	9.79 950		9.90 940	26	0.09 060	9.89 009	10	56
		15		26				
5	9.79 965		9.90 966	26	0.09 034	9.88 999	10	55
		16		26				
6	9.79 981		9.90 992	26	0.09 008	9.88 989	11	54
		15						
7	9.79 996		9.91 018		0.08 982	9.88 978		53
		16		25			10	
8	9.80 012		9.91 043	26	0.08 957	9.88 968	10	52
		15		26				
9	9.80 027		9.91 069	26	0.08 931	9.88 958	10	51
		16						
10	9.80 043		9.91 095	26	0.08 905	9.88 948	11	50
		15						
11	9.80 058		9.91 121	26	0.08 879	9.88 937	10	49
		16		26				
12	9.80 074		9.91 147	25	0.08 853	9.88 927	10	48
		15		26				
13	9.80 089		9.91 172	26	0.08 828	9.88 917	11	47
		16						
14	9.80 105		9.91 198	26	0.08 802	9.88 906	10	46
		15		26				
15	9.80 120		9.91 224	26	0.08 776	9.88 896	10	45
		16		26				
16	9.80 136		9.91 250	26	0.08 750	9.88 886	11	44
		15						
17	9.80 151		9.91 276	25	0.08 724	9.88 875	10	43
		15		26				
18	9.80 166		9.91 301	26	0.08 699	9.88 865	10	42
		16		26				
19	9.80 182		9.91 327	26	0.08 673	9.88 855	11	41
		15						
20	9.80 197		9.91 353	26	0.08 647	9.88 844	10	40
		16						
21	9.80 213		9.91 379	25	0.08 621	9.88 834	10	39
		15		26				
22	9.80 228		9.91 404	26	0.08 596	9.88 824	11	38
		16		26				
23	9.80 244		9.91 430	26	0.08 570	9.88 813	10	37
		15						
24	9.80 259		9.91 456	26	0.08 544	9.88 803	10	36
		15		25				
25	9.80 274		9.91 482	26	0.08 518	9.88 793	11	35
		16						
26	9.80 290		9.91 507	26	0.08 493	9.88 782	10	34
		15						
27	9.80 305		9.91 533	26	0.08 467	9.88 772	11	33
		15		26				
28	9.80 320		9.91 559	26	0.08 441	9.88 761	10	32
		16		25			10	
29	9.80 336		9.91 585		0.08 415	9.88 751		31
		15						
30	9.80 351		9.91 610	26	0.08 390	9.88 741	11	30
		15						
31	9.80 366		9.91 636	26	0.08 364	9.88 730	10	29
		16		26				
32	9.80 382		9.91 662	26	0.08 338	9.88 720	11	28
		15		25				
33	9.80 397		9.91 688		0.08 312	9.88 709	10	27
		15						
34	9.80 412		9.91 713	26	0.08 287	9.88 699	11	26
		16		26				
35	9.80 428		9.91 739	26	0.08 261	9.88 688	10	25
		15						
36	9.80 443		9.91 765	26	0.08 235	9.88 678	10	24
		15						
37	9.80 458		9.91 791	25	0.08 209	9.88 668	11	23
		15		26				
38	9.80 473		9.91 816	26	0.08 184	9.88 657	10	22
		16		26				
39	9.80 489		9.91 842	26	0.08 158	9.88 647	11	21
		15						
40	9.80 504		9.91 868	25	0.08 132	9.88 636	10	20
		15						
41	9.80 519		9.91 893	26	0.08 107	9.88 626	11	19
		15		26				
42	9.80 534		9.91 919	26	0.08 081	9.88 615	10	18
		16		26				
43	9.80 550		9.91 945	26	0.08 055	9.88 605	11	17
		15						
44	9.80 565		9.91 971	25	0.08 029	9.88 594	10	16
		15		26				
45	9.80 580		9.91 996	26	0.08 004	9.88 584	11	15
		15		26				
46	9.80 595		9.92 022	26	0.07 978	9.88 573	10	14
		15						
47	9.80 610		9.92 048	25	0.07 952	9.88 563	11	13
		15		26				
48	9.80 625		9.92 073	26	0.07 927	9.88 552	10	12
		16		26				
49	9.80 641		9.92 099	26	0.07 901	9.88 542	11	11
		15						
50	9.80 656		9.92 125	25	0.07 875	9.88 531	10	10
		15						
51	9.80 671		9.92 150	26	0.07 850	9.88 521	11	9
		15		26				
52	9.80 686		9.92 176	26	0.07 824	9.88 510	11	8
		15		25				
53	9.80 701		9.92 202		0.07 798	9.88 499	10	7
		15						
54	9.80 716		9.92 227	26	0.07 773	9.88 489	11	6
		15		26				
55	9.80 731		9.92 253	26	0.07 747	9.88 478	10	5
		15		25				
56	9.80 746		9.92 279		0.07 721	9.88 468	11	4
		16						
57	9.80 762		9.92 304	26	0.07 696	9.88 457	10	3
		15		26				
58	9.80 777		9.92 330	26	0.07 670	9.88 447	11	2
		15		25				
59	9.80 792		9.92 356		0.07 644	9.88 436	11	1
		15						
60	9.80 807		9.92 381		0.07 619	9.88 425		0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P P		
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

	16	15
1	0.3	0.2
2	0.5	0.5
3	0.8	0.8
4	1.1	1.0
5	1.3	1.2
6	1.6	1.5
7	1.9	1.8
8	2.1	2.0
9	2.4	2.2
10	2.7	2.5
20	5.3	5.0
30	8.0	7.5
40	10.7	10.0
50	13.3	12.5

	11	10
1	0.2	0.2
2	0.4	0.3
3	0.6	0.5
4	0.7	0.7
5	0.9	0.8
6	1.1	1.0
7	1.3	1.2
8	1.5	1.3
9	1.6	1.5
10	1.8	1.7
20	3.7	3.3
30	5.5	5.0
40	7.3	6.7
50	9.2	8.3

	$\frac{11}{26}$	$\frac{11}{25}$
0		
1	1.2	1.1
2	3.5	3.4
3	5.9	5.7
4	8.3	7.9
5	10.6	10.2
6	13.0	12.5
7	15.4	14.8
8	17.7	17.1
9	20.1	19.3
10	22.5	21.6
11	24.8	23.9

P P	

*140° 230° *320°

50°

40°

*130° 220° *310°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	′
0	9.80 807		9.92 381		0.07 619	9.88 425		60
		15		26			10	
1	9.80 822		9.92 407		0.07 593	9.88 415		59
		15		26			10	
2	9.80 837		9.92 433		0.07 567	9.88 404		58
		15		25			11	
3	9.80 852		9.92 458		0.07 542	9.88 394		57
		15		26			11	
4	9.80 867		9.92 484		0.07 516	9.88 383		56
		15		26			10	
5	9.80 882		9.92 510		0.07 490	9.88 372		55
		15		25			11	
6	9.80 897		9.92 535		0.07 465	9.88 362		54
		15		26			11	
7	9.80 912		9.92 561		0.07 439	9.88 351		53
		15		26			10	
8	9.80 927		9.92 587		0.07 413	9.88 340		52
		15		25			11	
9	9.80 942		9.92 612		0.07 388	9.88 330		51
		15		26			11	
10	9.80 957		9.92 638		0.07 362	9.88 319		50
		15		25			11	
11	9.80 972		9.92 663		0.07 337	9.88 308		49
		15		26			10	
12	9.80 987		9.92 689		0.07 311	9.88 298		48
		15		26			11	
13	9.81 002		9.92 715		0.07 285	9.88 287		47
		15		25			11	
14	9.81 017		9.92 740		0.07 260	9.88 276		46
		15		26			10	
15	9.81 032		9.92 766		0.07 234	9.88 266		45
		15		26			11	
16	9.81 047		9.92 792		0.07 208	9.88 255		44
		14		25			11	
17	9.81 061		9.92 817		0.07 183	9.88 244		43
		15		26			10	
18	9.81 076		9.92 843		0.07 157	9.88 234		42
		15		25			11	
19	9.81 091		9.92 868		0.07 132	9.88 223		41
		15		26			11	
20	9.81 106		9.92 894		0.07 106	9.88 212		40
		15		26			11	
21	9.81 121		9.92 920		0.07 080	9.88 201		39
		15		25			10	
22	9.81 136		9.92 945		0.07 055	9.88 191		38
		15		26			11	
23	9.81 151		9.92 971		0.07 029	9.88 180		37
		15		25			11	
24	9.81 166		9.92 996		0.07 004	9.88 169		36
		14		26			11	
25	9.81 180		9.93 022		0.06 978	9.88 158		35
		15		26			10	
26	9.81 195		9.93 048		0.06 952	9.88 148		34
		15		25			11	
27	9.81 210		9.93 073		0.06 927	9.88 137		33
		15		26			11	
28	9.81 225		9.93 099		0.06 901	9.88 126		32
		15		25			11	
29	9.81 240		9.93 124		0.06 876	9.88 115		31
		14		26			10	
30	9.81 254		9.93 150		0.06 850	9.88 105		30
		15		25			11	
31	9.81 269		9.93 175		0.06 825	9.88 094		29
		15		26			11	
32	9.81 284		9.93 201		0.06 799	9.88 083		28
		15		26			11	
33	9.81 299		9.93 227		0.06 773	9.88 072		27
		15		25			11	
34	9.81 314		9.93 252		0.06 748	9.88 061		26
		14		26			10	
35	9.81 328		9.93 278		0.06 722	9.88 051		25
		15		25			11	
36	9.81 343		9.93 303		0.06 697	9.88 040		24
		15		26			11	
37	9.81 358		9.93 329		0.06 671	9.88 029		23
		14		25			11	
38	9.81 372		9.93 354		0.06 646	9.88 018		22
		15		26			11	
39	9.81 387		9.93 380		0.06 620	9.88 007		21
		15		26			11	
40	9.81 402		9.93 406		0.06 594	9.87 996		20
		15		25			11	
41	9.81 417		9.93 431		0.06 569	9.87 985		19
		14		26			10	
42	9.81 431		9.93 457		0.06 543	9.87 975		18
		15		25			11	
43	9.81 446		9.93 482		0.06 518	9.87 964		17
		15		26			11	
44	9.81 461		9.93 508		0.06 492	9.87 953		16
		14		25			11	
45	9.81 475		9.93 533		0.06 467	9.87 942		15
		15		26			11	
46	9.81 490		9.93 559		0.06 441	9.87 931		14
		15		25			11	
47	9.81 505		9.93 584		0.06 416	9.87 920		13
		14		26			11	
48	9.81 519		9.93 610		0.06 390	9.87 909		12
		15		26			11	
49	9.81 534		9.93 636		0.06 364	9.87 898		11
		15		25			11	
50	9.81 549		9.93 661		0.06 339	9.87 887		10
		14		26			10	
51	9.81 563		9.93 687		0.06 313	9.87 877		9
		15		25			11	
52	9.81 578		9.93 712		0.06 288	9.87 866		8
		14		26			11	
53	9.81 592		9.93 738		0.06 262	9.87 855		7
		15		25			11	
54	9.81 607		9.93 763		0.06 237	9.87 844		6
		15		26			11	
55	9.81 622		9.93 789		0.06 211	9.87 833		5
		14		25			11	
56	9.81 636		9.93 814		0.06 186	9.87 822		4
		15		26			11	
57	9.81 651		9.93 840		0.06 160	9.87 811		3
		14		25			11	
58	9.81 665		9.93 865		0.06 135	9.87 800		2
		15		26			11	
59	9.81 680		9.93 891		0.06 109	9.87 789		1
		14		25			11	
60	9.81 694		9.93 916		0.06 084	9.87 778		0
′	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P	
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

P	P	
	15	14
1	0.2	0.2
2	0.5	0.5
3	0.8	0.7
4	1.0	0.9
5	1.2	1.2
6	1.5	1.4
7	1.8	1.6
8	2.0	1.9
9	2.2	2.1
10	2.5	2.3
20	5.0	4.7
30	7.5	7.0
40	10.0	9.3
50	12.5	11.7

P	P	
	11	10
1	0.2	0.2
2	0.4	0.3
3	0.6	0.5
4	0.7	0.7
5	0.9	0.8
6	1.1	1.0
7	1.3	1.2
8	1.5	1.3
9	1.6	1.5
10	1.8	1.7
20	3.7	3.3
30	5.5	5.0
40	7.3	6.7
50	9.2	8.3

P	P	
	11 / 26	10 / 26	10 / 25
0	1.2	1.3	1.2
1	3.5	3.9	3.8
2	5.9	6.5	6.2
3	8.3	9.1	8.8
4	10.6	11.7	11.2
5	13.0	14.3	13.8
6	15.4	16.9	16.2
7	17.7	19.5	18.8
8	20.1	22.1	21.2
9	22.5	24.7	23.8
10	24.8	—	—
11			

*139° 229° *319°

41°

*131° 221° *311°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.81 694		9.93 916		0.06 084	9.87 778		60
		15		26			11	
1	9.81 709		9.93 942		0.06 058	9.87 767		59
2	9.81 723	14	9.93 967	25	0.06 033	9.87 756	11	58
3	9.81 738	15	9.93 993	26	0.06 007	9.87 745	11	57
		14		25			11	
4	9.81 752		9.94 018		0.05 982	9.87 734		56
5	9.81 767	15	9.94 044	26	0.05 956	9.87 723	11	55
6	9.81 781	14	9.94 069	25	0.05 931	9.87 712	11	54
		15		26			11	
7	9.81 796		9.94 095		0.05 905	9.87 701		53
8	9.81 810	14	9.94 120	25	0.05 880	9.87 690	11	52
9	9.81 825	15	9.94 146	26	0.05 854	9.87 679	11	51
10	9.81 839	14	9.94 171	25	0.05 829	9.87 668	11	50
		15		26			11	
11	9.81 854		9.94 197		0.05 803	9.87 657		49
12	9.81 868	14	9.94 222	25	0.05 778	9.87 646	11	48
13	9.81 882	14	9.94 248	26	0.05 752	9.87 635	11	47
		15		25			11	
14	9.81 897		9.94 273		0.05 727	9.87 624		46
15	9.81 911	14	9.94 299	26	0.05 701	9.87 613	11	45
16	9.81 926	15	9.94 324	25	0.05 676	9.87 601	12	44
		14		26			11	
17	9.81 940		9.94 350		0.05 650	9.87 590		43
18	9.81 955	15	9.94 375	25	0.05 625	9.87 579	11	42
19	9.81 969	14	9.94 401	26	0.05 599	9.87 568	11	41
20	9.81 983	14	9.94 426	25	0.05 574	9.87 557	11	40
		15		26			11	
21	9.81 998		9.94 452		0.05 548	9.87 546		39
22	9.82 012	14	9.94 477	25	0.05 523	9.87 535	11	38
23	9.82 026	14	9.94 503	26	0.05 497	9.87 524	11	37
		15		25			11	
24	9.82 041		9.94 528		0.05 472	9.87 513		36
25	9.82 055	14	9.94 554	26	0.05 446	9.87 501	12	35
26	9.82 069	14	9.94 579	25	0.05 421	9.87 490	11	34
		15		25			11	
27	9.82 084		9.94 604		0.05 396	9.87 479		33
28	9.82 098	14	9.94 630	26	0.05 370	9.87 468	11	32
29	9.82 112	14	9.94 655	25	0.05 345	9.87 457	11	31
30	9.82 126	14	9.94 681	26	0.05 319	9.87 446	11	30
		15		25			12	
31	9.82 141		9.94 706		0.05 294	9.87 434		29
32	9.82 155	14	9.94 732	26	0.05 268	9.87 423	11	28
33	9.82 169	14	9.94 757	25	0.05 243	9.87 412	11	27
		15		26			11	
34	9.82 184		9.94 783		0.05 217	9.87 401		26
35	9.82 198	14	9.94 808	25	0.05 192	9.87 390	11	25
36	9.82 212	14	9.94 834	26	0.05 166	9.87 378	12	24
		14		25			11	
37	9.82 226		9.94 859		0.05 141	9.87 367		23
38	9.82 240	14	9.94 884	25	0.05 116	9.87 356	11	22
39	9.82 255	14	9.94 910	26	0.05 090	9.87 345	11	21
40	9.82 269	14	9.94 935	25	0.05 065	9.87 334	11	20
		14		26			12	
41	9.82 283		9.94 961		0.05 039	9.87 322		19
42	9.82 297	14	9.94 986	25	0.05 014	9.87 311	11	18
43	9.82 311	14	9.95 012	26	0.04 988	9.87 300	11	17
		15		25			12	
44	9.82 326		9.95 037		0.04 963	9.87 288		16
45	9.82 340	14	9.95 062	25	0.04 938	9.87 277	11	15
46	9.82 354	14	9.95 088	26	0.04 912	9.87 266	11	14
		14		25			11	
47	9.82 368		9.95 113		0.04 887	9.87 255		13
48	9.82 382	14	9.95 139	26	0.04 861	9.87 243	12	12
49	9.82 396	14	9.95 164	25	0.04 836	9.87 232	11	11
50	9.82 410	14	9.95 190	26	0.04 810	9.87 221	11	10
		14		25			12	
51	9.82 424		9.95 215		0.04 785	9.87 209		9
52	9.82 439	15	9.95 240	25	0.04 760	9.87 198	11	8
53	9.82 453	14	9.95 266	26	0.04 734	9.87 187	11	7
		14		25			12	
54	9.82 467		9.95 291		0.04 709	9.87 175		6
55	9.82 481	14	9.95 317	26	0.04 683	9.87 164	11	5
56	9.82 495	14	9.95 342	25	0.04 658	9.87 153	11	4
		14		26			12	
57	9.82 509		9.95 368		0.04 632	9.87 141		3
58	9.82 523	14	9.95 393	25	0.04 607	9.87 130	11	2
59	9.82 537	14	9.95 418	25	0.04 582	9.87 119	11	1
60	9.82 551	14	9.95 444	26	0.04 556	9.87 107	12	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

P	P	
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

P	P	
	15	14
1	0.2	0.2
2	0.5	0.5
3	0.8	0.7
4	1.0	0.9
5	1.2	1.2
6	1.5	1.4
7	1.8	1.6
8	2.0	1.9
9	2.2	2.1
10	2.5	2.3
20	5.0	4.7
30	7.5	7.0
40	10.0	9.3
50	12.5	11.7

P	P	
	12	11
1	0.2	0.2
2	0.4	0.4
3	0.6	0.6
4	0.8	0.7
5	1.0	0.9
6	1.2	1.1
7	1.4	1.3
8	1.6	1.5
9	1.8	1.6
10	2.0	1.8
20	4.0	3.7
30	6.0	5.5
40	8.0	7.3
50	10.0	9.2

	12	12	11
	26	25	25
0	1.1	1.1	1.1
1	3.2	3.1	3.4
2	5.4	5.2	5.7
3	7.6	7.3	7.9
4	9.8	9.4	10.2
5	11.9	11.5	12.5
6	14.1	13.5	14.8
7	16.2	15.6	17.1
8	18.4	17.7	19.3
9	20.6	19.8	21.6
10	22.8	21.9	23.9
11	24.9	23.9	—
12			

P	P

*138° 228° *318°

48°

42°

*132° 222° *312°

	L Sin	d	L Tan	c d	L Cot	L Cos	d		P P
0	9.82 551	14	9.95 444	25	0.04 556	9.87 107	11	60	26 25
1	9.82 565	14	9.95 469	26	0.04 531	9.87 096	11	59	1 0.4 0.4
2	9.82 579	14	9.95 495	25	0.04 505	9.87 085	12	58	2 0.9 0.8
3	9.82 593	14	9.95 520	25	0.04 480	9.87 073	11	57	3 1.3 1.2
4	9.82 607	14	9.95 545	26	0.04 455	9.87 062	12	56	4 1.7 1.7
5	9.82 621	14	9.95 571	25	0.04 429	9.87 050	11	55	5 2.2 2.1
6	9.82 635	14	9.95 596	26	0.04 404	9.87 039	11	54	6 2.6 2.5
7	9.82 649	14	9.95 622	25	0.04 378	9.87 028	12	53	7 3.0 2.9
8	9.82 663	14	9.95 647	25	0.04 353	9.87 016	11	52	8 3.5 3.3
9	9.82 677	14	9.95 672	26	0.04 328	9.87 005	12	51	9 3.9 3.8
10	9.82 691	14	9.95 698	25	0.04 302	9.86 993	11	50	10 4.3 4.2
11	9.82 705	14	9.95 723	25	0.04 277	9.86 982	12	49	20 8.7 8.3
12	9.82 719	14	9.95 748	26	0.04 252	9.86 970	11	48	30 13.0 12.5
13	9.82 733	14	9.95 774	25	0.04 226	9.86 959	12	47	40 17.3 16.7
14	9.82 747	14	9.95 799	26	0.04 201	9.86 947	11	46	50 21.7 20.8
15	9.82 761	14	9.95 825	25	0.04 175	9.86 936	12	45	14 13
16	9.82 775	13	9.95 850	25	0.04 150	9.86 924	11	44	1 0.2 0.2
17	9.82 788	14	9.95 875	26	0.04 125	9.86 913	11	43	2 0.5 0.4
18	9.82 802	14	9.95 901	25	0.04 099	9.86 902	12	42	3 0.7 0.6
19	9.82 816	14	9.95 926	26	0.04 074	9.86 890	11	41	4 0.9 0.9
20	9.82 830	14	9.95 952	25	0.04 048	9.86 879	12	40	5 1.2 1.1
21	9.82 844	14	9.95 977	25	0.04 023	9.86 867	12	39	6 1.4 1.3
22	9.82 858	14	9.96 002	26	0.03 998	9.86 855	11	38	7 1.6 1.5
23	9.82 872	13	9.96 028	25	0.03 972	9.86 844	12	37	8 1.9 1.7
24	9.82 885	14	9.96 053	25	0.03 947	9.86 832	11	36	9 2.1 2.0
25	9.82 899	14	9.96 078	26	0.03 922	9.86 821	12	35	10 2.3 2.2
26	9.82 913	14	9.96 104	25	0.03 896	9.86 809	11	34	20 4.7 4.3
27	9.82 927	14	9.96 129	26	0.03 871	9.86 798	12	33	30 7.0 6.5
28	9.82 941	14	9.96 155	25	0.03 845	9.86 786	11	32	40 9.3 8.7
29	9.82 955	13	9.96 180	25	0.03 820	9.86 775	12	31	50 11.7 10.8
30	9.82 968	14	9.96 205	26	0.03 795	9.86 763	11	30	12 11
31	9.82 982	14	9.96 231	25	0.03 769	9.86 752	12	29	1 0.2 0.2
32	9.82 996	14	9.96 256	25	0.03 744	9.86 740	12	28	2 0.4 0.4
33	9.83 010	13	9.96 281	26	0.03 719	9.86 728	11	27	3 0.6 0.6
34	9.83 023	14	9.96 307	25	0.03 693	9.86 717	12	26	4 0.8 0.7
35	9.83 037	14	9.96 332	25	0.03 668	9.86 705	11	25	5 1.0 0.9
36	9.83 051	14	9.96 357	26	0.03 643	9.86 694	12	24	6 1.2 1.1
37	9.83 065	14	9.96 383	25	0.03 617	9.86 682	12	23	7 1.4 1.3
38	9.83 078	13	9.96 408	25	0.03 592	9.86 670	11	22	8 1.6 1.5
39	9.83 092	14	9.96 433	26	0.03 567	9.86 659	12	21	9 1.8 1.6
40	9.83 106	14	9.96 459	25	0.03 541	9.86 647	12	20	10 2.0 1.8
41	9.83 120	13	9.96 484	26	0.03 516	9.86 635	11	19	20 4.0 3.7
42	9.83 133	14	9.96 510	25	0.03 490	9.86 624	12	18	30 6.0 5.5
43	9.83 147	14	9.96 535	25	0.03 465	9.86 612	12	17	40 8.0 7.3
44	9.83 161	13	9.96 560	26	0.03 440	9.86 600	11	16	50 10.0 9.2
45	9.83 174	14	9.96 586	25	0.03 414	9.86 589	12	15	
46	9.83 188	14	9.96 611	25	0.03 389	9.86 577	12	14	12 11 11
47	9.83 202	13	9.96 636	26	0.03 364	9.86 565	11	13	26 26 25
48	9.83 215	14	9.96 662	25	0.03 338	9.86 554	12	12	0 1.1 1.2 1.1
49	9.83 229	13	9.96 687	25	0.03 313	9.86 542	12	11	1 3.2 3.5 3.4
50	9.83 242	14	9.96 712	26	0.03 288	9.86 530	12	10	2 5.4 5.9 5.7
51	9.83 256	14	9.96 738	25	0.03 262	9.86 518	12	9	3 7.6 8.3 7.9
52	9.83 270	13	9.96 763	25	0.03 237	9.86 507	11	8	4 9.8 10.6 10.2
53	9.83 283	14	9.96 788	26	0.03 212	9.86 495	12	7	5 11.9 13.0 12.5
54	9.83 297	13	9.96 814	25	0.03 186	9.86 483	12	6	6 14.1 15.4 14.8
55	9.83 310	14	9.96 839	25	0.03 161	9.86 472	11	5	7 16.2 17.7 17.1
56	9.83 324	14	9.96 864	26	0.03 136	9.86 460	12	4	8 18.4 20.1 19.3
57	9.83 338	13	9.96 890	25	0.03 110	9.86 448	12	3	9 20.6 22.5 21.6
58	9.83 351	14	9.96 915	25	0.03 085	9.86 436	11	2	10 22.8 24.8 23.9
59	9.83 365	13	9.96 940	26	0.03 060	9.86 425	12	1	11 24.9 — —
60	9.83 378		9.96 966		0.03 034	9.86 413		0	12
	L Cos	d	L Cot	c d	L Tan	L Sin	d		P P

*137° 227° *317°

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*133° 223° *313°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.83 378		9.96 966		0.03 034	9.86 413		60
		14		25			12	
1	9.83 392		9.96 991		0.03 009	9.86 401		59
2	9.83 405	13	9.97 016	25	0.02 984	9.86 389	12	58
3	9.83 419	14	9.97 042	26	0.02 958	9.86 377	12	57
		13		25			11	
4	9.83 432		9.97 067		0.02 933	9.86 366		56
5	9.83 446	14	9.97 092	25	0.02 908	9.86 354	12	55
6	9.83 459	13	9.97 118	26	0.02 882	9.86 342	12	54
		14		25			12	
7	9.83 473		9.97 143		0.02 857	9.86 330		53
8	9.83 486	13	9.97 168	25	0.02 832	9.86 318	12	52
9	9.83 500	14	9.97 193	25	0.02 807	9.86 306	12	51
10	9.83 513	13	9.97 219	26	0.02 781	9.86 295	11	50
		14		25			12	
11	9.83 527		9.97 244		0.02 756	9.86 283		49
12	9.83 540	13	9.97 269	25	0.02 731	9.86 271	12	48
13	9.83 554	14	9.97 295	26	0.02 705	9.86 259	12	47
		13		25			12	
14	9.83 567		9.97 320		0.02 680	9.86 247		46
15	9.83 581	14	9.97 345	25	0.02 655	9.86 235	12	45
16	9.83 594	13	9.97 371	26	0.02 629	9.86 223	12	44
		14		25			12	
17	9.83 608		9.97 396		0.02 604	9.86 211		43
18	9.83 621	13	9.97 421	25	0.02 579	9.86 200	11	42
19	9.83 634	13	9.97 447	26	0.02 553	9.86 188	12	41
20	9.83 648	14	9.97 472	25	0.02 528	9.86 176	12	40
		13		25			12	
21	9.83 661		9.97 497		0.02 503	9.86 164		39
22	9.83 674	13	9.97 523	26	0.02 477	9.86 152	12	38
23	9.83 688	14	9.97 548	25	0.02 452	9.86 140	12	37
		13		25			12	
24	9.83 701		9.97 573		0.02 427	9.86 128		36
25	9.83 715	14	9.97 598	25	0.02 402	9.86 116	12	35
26	9.83 728	13	9.97 624	26	0.02 376	9.86 104	12	34
		13		25			12	
27	9.83 741		9.97 649		0.02 351	9.86 092		33
28	9.83 755	14	9.97 674	25	0.02 326	9.86 080	12	32
29	9.83 768	13	9.97 700	26	0.02 300	9.86 068	12	31
30	9.83 781	13	9.97 725	25	0.02 275	9.86 056	12	30
		14		25			12	
31	9.83 795		9.97 750		0.02 250	9.86 044		29
32	9.83 808	13	9.97 776	26	0.02 224	9.86 032	12	28
33	9.83 821	13	9.97 801	25	0.02 199	9.86 020	12	27
		13		25			12	
34	9.83 834		9.97 826		0.02 174	9.86 008		26
35	9.83 848	14	9.97 851	25	0.02 149	9.85 996	12	25
36	9.83 861	13	9.97 877	26	0.02 123	9.85 984	12	24
		13		25			12	
37	9.83 874		9.97 902		0.02 098	9.85 972		23
38	9.83 887	13	9.97 927	25	0.02 073	9.85 960	12	22
39	9.83 901	14	9.97 953	26	0.02 047	9.85 948	12	21
40	9.83 914	13	9.97 978	25	0.02 022	9.85 936	12	20
		13		25			12	
41	9.83 927		9.98 003		0.01 997	9.85 924		19
42	9.83 940	13	9.98 029	26	0.01 971	9.85 912	12	18
43	9.83 954	14	9.98 054	25	0.01 946	9.85 900	12	17
		13		25			12	
44	9.83 967		9.98 079		0.01 921	9.85 888		16
45	9.83 980	13	9.98 104	25	0.01 896	9.85 876	12	15
46	9.83 993	13	9.98 130	26	0.01 870	9.85 864	12	14
		13		25			13	
47	9.84 006		9.98 155		0.01 845	9.85 851		13
48	9.84 020	14	9.98 180	25	0.01 820	9.85 839	12	12
49	9.84 033	13	9.98 206	26	0.01 794	9.85 827	12	11
50	9.84 046	13	9.98 231	25	0.01 769	9.85 815	12	10
		13		25			12	
51	9.84 059		9.98 256		0.01 744	9.85 803		9
52	9.84 072	13	9.98 281	25	0.01 719	9.85 791	12	8
53	9.84 085	13	9.98 307	26	0.01 693	9.85 779	12	7
		13		25			13	
54	9.84 098		9.98 332		0.01 668	9.85 766		6
55	9.84 112	14	9.98 357	25	0.01 643	9.85 754	12	5
56	9.84 125	13	9.98 383	26	0.01 617	9.85 742	12	4
		13		25			12	
57	9.84 138		9.98 408		0.01 592	9.85 730		3
58	9.84 151	13	9.98 433	25	0.01 567	9.85 718	12	2
59	9.84 164	13	9.98 458	25	0.01 542	9.85 706	12	1
60	9.84 177	13	9.98 484	26	0.01 516	9.85 693	13	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	

	P	P
	26	25
1	0.4	0.4
2	0.9	0.8
3	1.3	1.2
4	1.7	1.7
5	2.2	2.1
6	2.6	2.5
7	3.0	2.9
8	3.5	3.3
9	3.9	3.8
10	4.3	4.2
20	8.7	8.3
30	13.0	12.5
40	17.3	16.7
50	21.7	20.8

	P	P
	14	13
1	0.2	0.2
2	0.5	0.4
3	0.7	0.6
4	0.9	0.9
5	1.2	1.1
6	1.4	1.3
7	1.6	1.5
8	1.9	1.7
9	2.1	2.0
10	2.3	2.2
20	4.7	4.3
30	7.0	6.5
40	9.3	8.7
50	11.7	10.8

	P	P
	12	11
1	0.2	0.2
2	0.4	0.4
3	0.6	0.6
4	0.8	0.7
5	1.0	0.9
6	1.2	1.1
7	1.4	1.3
8	1.6	1.5
9	1.8	1.6
10	2.0	1.8
20	4.0	3.7
30	6.0	5.5
40	8.0	7.3
50	10.0	9.2

	P	P	P
	13	13	12
	26	25	25
0	1.0	0.9	1.1
1	3.0	2.9	3.1
2	5.0	4.8	5.2
3	7.0	6.7	7.3
4	9.0	8.7	9.4
5	11.0	10.6	11.5
6	13.0	12.5	13.5
7	15.0	14.4	15.6
8	17.0	16.3	17.7
9	19.0	18.3	19.8
10	21.0	20.2	21.9
11	23.0	22.1	23.9
12	25.0	24.1	—
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*136° 226° *316°

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*134° 224° *314°

′	L Sin	d	L Tan	c d	L Cot	L Cos	d	
0	9.84 177		9.98 484		0.01 516	9.85 693		60
1	9.84 190	13	9.98 509	25	0.01 491	9.85 681	12	59
2	9.84 203	13	9.98 534	25	0.01 466	9.85 669	12	58
3	9.84 216	13	9.98 560	26	0.01 440	9.85 657	12	57
4	9.84 229	13	9.98 585	25	0.01 415	9.85 645	12	56
5	9.84 242	13	9.98 610	25	0.01 390	9.85 632	13	55
6	9.84 255	13	9.98 635	25	0.01 365	9.85 620	12	54
7	9.84 269	14	9.98 661	26	0.01 339	9.85 608	12	53
8	9.84 282	13	9.98 686	25	0.01 314	9.85 596	12	52
9	9.84 295	13	9.98 711	25	0.01 289	9.85 583	13	51
10	9.84 308	13	9.98 737	26	0.01 263	9.85 571	12	50
11	9.84 321	13	9.98 762	25	0.01 238	9.85 559	12	49
12	9.84 334	13	9.98 787	25	0.01 213	9.85 547	12	48
13	9.84 347	13	9.98 812	25	0.01 188	9.85 534	13	47
14	9.84 360	13	9.98 838	26	0.01 162	9.85 522	12	46
15	9.84 373	13	9.98 863	25	0.01 137	9.85 510	12	45
16	9.84 385	12	9.98 888	25	0.01 112	9.85 497	13	44
17	9.84 398	13	9.98 913	25	0.01 087	9.85 485	12	43
18	9.84 411	13	9.98 939	26	0.01 061	9.85 473	12	42
19	9.84 424	13	9.98 964	25	0.01 036	9.85 460	13	41
20	9.84 437	13	9.98 989	25	0.01 011	9.85 448	12	40
21	9.84 450	13	9.99 015	26	0.00 985	9.85 436	12	39
22	9.84 463	13	9.99 040	25	0.00 960	9.85 423	13	38
23	9.84 476	13	9.99 065	25	0.00 935	9.85 411	12	37
24	9.84 489	13	9.99 090	25	0.00 910	9.85 399	12	36
25	9.84 502	13	9.99 116	26	0.00 884	9.85 386	13	35
26	9.84 515	13	9.99 141	25	0.00 859	9.85 374	12	34
27	9.84 528	13	9.99 166	25	0.00 834	9.85 361	13	33
28	9.84 540	12	9.99 191	25	0.00 809	9.85 349	12	32
29	9.84 553	13	9.99 217	26	0.00 783	9.85 337	12	31
30	9.84 566	13	9.99 242	25	0.00 758	9.85 324	13	30
31	9.84 579	13	9.99 267	25	0.00 733	9.85 312	12	29
32	9.84 592	13	9.99 293	26	0.00 707	9.85 299	13	28
33	9.84 605	13	9.99 318	25	0.00 682	9.85 287	12	27
34	9.84 618	13	9.99 343	25	0.00 657	9.85 274	13	26
35	9.84 630	12	9.99 368	25	0.00 632	9.85 262	12	25
36	9.84 643	13	9.99 394	26	0.00 606	9.85 250	12	24
37	9.84 656	13	9.99 419	25	0.00 581	9.85 237	13	23
38	9.84 669	13	9.99 444	25	0.00 556	9.85 225	12	22
39	9.84 682	13	9.99 469	25	0.00 531	9.85 212	13	21
40	9.84 694	12	9.99 495	26	0.00 505	9.85 200	12	20
41	9.84 707	13	9.99 520	25	0.00 480	9.85 187	13	19
42	9.84 720	13	9.99 545	25	0.00 455	9.85 175	12	18
43	9.84 733	13	9.99 570	25	0.00 430	9.85 162	13	17
44	9.84 745	12	9.99 596	26	0.00 404	9.85 150	12	16
45	9.84 758	13	9.99 621	25	0.00 379	9.85 137	13	15
46	9.84 771	13	9.99 646	25	0.00 354	9.85 125	12	14
47	9.84 784	13	9.99 672	26	0.00 328	9.85 112	13	13
48	9.84 796	12	9.99 697	25	0.00 303	9.85 100	12	12
49	9.84 809	13	9.99 722	25	0.00 278	9.85 087	13	11
50	9.84 822	13	9.99 747	25	0.00 253	9.85 074	13	10
51	9.84 835	13	9.99 773	26	0.00 227	9.85 062	12	9
52	9.84 847	12	9.99 798	25	0.00 202	9.85 049	13	8
53	9.84 860	13	9.99 823	25	0.00 177	9.85 037	12	7
54	9.84 873	13	9.99 848	25	0.00 152	9.85 024	13	6
55	9.84 885	12	9.99 874	26	0.00 126	9.85 012	12	5
56	9.84 898	13	9.99 899	25	0.00 101	9.84 999	13	4
57	9.84 911	13	9.99 924	25	0.00 076	9.84 986	13	3
58	9.84 923	12	9.99 949	25	0.00 051	9.84 974	12	2
59	9.84 936	13	9.99 975	26	0.00 025	9.84 961	13	1
60	9.84 949	13	0.00 000	25	0.00 000	9.84 949	12	0
	L Cos	d	L Cot	c d	L Tan	L Sin	d	′

*135° 225° *315°

45°

P	P
	26 | 25
1	0.4 | 0.4
2	0.9 | 0.8
3	1.3 | 1.2
4	1.7 | 1.7
5	2.2 | 2.1
6	2.6 | 2.5
7	3.0 | 2.9
8	3.5 | 3.3
9	3.9 | 3.8
10	4.3 | 4.2
20	8.7 | 8.3
30	13.0 | 12.5
40	17.3 | 16.7
50	21.7 | 20.8

	14	13	12
1	0.2	0.2	0.2
2	0.5	0.4	0.4
3	0.7	0.6	0.6
4	0.9	0.9	0.8
5	1.2	1.1	1.0
6	1.4	1.3	1.2
7	1.6	1.5	1.4
8	1.9	1.7	1.6
9	2.1	2.0	1.8
10	2.3	2.2	2.0
20	4.7	4.3	4.0
30	7.0	6.5	6.0
40	9.3	8.7	8.0
50	11.7	10.8	10.0

	13 | 13
	26 | 25
0	1.0 | 0.9
1	3.0 | 2.9
2	5.0 | 4.8
3	7.0 | 6.7
4	9.0 | 8.7
5	11.0 | 10.6
6	13.0 | 12.5
7	15.0 | 14.4
8	17.0 | 16.3
9	19.0 | 18.3
10	21.0 | 20.2
11	23.0 | 22.1
12	25.0 | 24.1
13	

	12 | 12
	26 | 25
0	1.1 | 1.1
1	3.2 | 3.1
2	5.4 | 5.2
3	7.6 | 7.3
4	9.8 | 9.4
5	11.9 | 11.5
6	14.1 | 13.5
7	16.2 | 15.6
8	18.4 | 17.7
9	20.6 | 19.8
10	22.8 | 21.9
11	24.9 | 23.9
12	

V

TABLE OF THE NATURAL

TRIGONOMETRIC FUNCTIONS

FROM MINUTE TO MINUTE.

*90° 180° *270° 0° NATURAL 1° *91° 181° *271°

′	Sin	Tan	Cot	Cos	
0	0.0000	0.0000	∞	1.0000	60
1	0.0003	0.0003	3437.75	1.0000	59
2	0.0006	0.0006	1718.87	1.0000	58
3	0.0009	0.0009	1145.92	1.0000	57
4	0.0012	0.0012	859.436	1.0000	56
5	0.0015	0.0015	687.549	1.0000	55
6	0.0017	0.0017	572.957	1.0000	54
7	0.0020	0.0020	491.106	1.0000	53
8	0.0023	0.0023	429.718	1.0000	52
9	0.0026	0.0026	381.971	1.0000	51
10	0.0029	0.0029	343.774	1.0000	50
11	0.0032	0.0032	312.521	1.0000	49
12	0.0035	0.0035	286.478	1.0000	48
13	0.0038	0.0038	264.441	1.0000	47
14	0.0041	0.0041	245.552	1.0000	46
15	0.0044	0.0044	229.182	1.0000	45
16	0.0047	0.0047	214.858	1.0000	44
17	0.0049	0.0049	202.219	1.0000	43
18	0.0052	0.0052	190.984	1.0000	42
19	0.0055	0.0055	180.932	1.0000	41
20	0.0058	0.0058	171.885	1.0000	40
21	0.0061	0.0061	163.700	1.0000	39
22	0.0064	0.0064	156.259	1.0000	38
23	0.0067	0.0067	149.465	1.0000	37
24	0.0070	0.0070	143.237	1.0000	36
25	0.0073	0.0073	137.507	1.0000	35
26	0.0076	0.0076	132.219	1.0000	34
27	0.0079	0.0079	127.321	1.0000	33
28	0.0081	0.0081	122.774	1.0000	32
29	0.0084	0.0084	118.540	1.0000	31
30	0.0087	0.0087	114.589	1.0000	30
31	0.0090	0.0090	110.892	1.0000	29
32	0.0093	0.0093	107.426	1.0000	28
33	0.0096	0.0096	104.171	1.0000	27
34	0.0099	0.0099	101.107	1.0000	26
35	0.0102	0.0102	98.2179	0.9999	25
36	0.0105	0.0105	95.4895	0.9999	24
37	0.0108	0.0108	92.9085	0.9999	23
38	0.0111	0.0111	90.4633	0.9999	22
39	0.0113	0.0113	88.1436	0.9999	21
40	0.0116	0.0116	85.9398	0.9999	20
41	0.0119	0.0119	83.8435	0.9999	19
42	0.0122	0.0122	81.8470	0.9999	18
43	0.0125	0.0125	79.9434	0.9999	17
44	0.0128	0.0128	78.1263	0.9999	16
45	0.0131	0.0131	76.3900	0.9999	15
46	0.0134	0.0134	74.7292	0.9999	14
47	0.0137	0.0137	73.1390	0.9999	13
48	0.0140	0.0140	71.6151	0.9999	12
49	0.0143	0.0143	70.1533	0.9999	11
50	0.0145	0.0145	68.7501	0.9999	10
51	0.0148	0.0148	67.4019	0.9999	9
52	0.0151	0.0151	66.1055	0.9999	8
53	0.0154	0.0154	64.8580	0.9999	7
54	0.0157	0.0157	63.6567	0.9999	6
55	0.0160	0.0160	62.4992	0.9999	5
56	0.0163	0.0163	61.3829	0.9999	4
57	0.0166	0.0166	60.3058	0.9999	3
58	0.0169	0.0169	59.2659	0.9999	2
59	0.0172	0.0172	58.2612	0.9999	1
60	0.0175	0.0175	57.2900	0.9998	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.0175	0.0175	57.2900	0.9998	60
1	0.0177	0.0177	56.3506	0.9998	59
2	0.0180	0.0180	55.4415	0.9998	58
3	0.0183	0.0183	54.5613	0.9998	57
4	0.0186	0.0186	53.7086	0.9998	56
5	0.0189	0.0189	52.8821	0.9998	55
6	0.0192	0.0192	52.0807	0.9998	54
7	0.0195	0.0195	51.3032	0.9998	53
8	0.0198	0.0198	50.5485	0.9998	52
9	0.0201	0.0201	49.8157	0.9998	51
10	0.0204	0.0204	49.1039	0.9998	50
11	0.0207	0.0207	48.4121	0.9998	49
12	0.0209	0.0209	47.7395	0.9998	48
13	0.0212	0.0212	47.0853	0.9998	47
14	0.0215	0.0215	46.4489	0.9998	46
15	0.0218	0.0218	45.8294	0.9998	45
16	0.0221	0.0221	45.2261	0.9998	44
17	0.0224	0.0224	44.6386	0.9997	43
18	0.0227	0.0227	44.0661	0.9997	42
19	0.0230	0.0230	43.5081	0.9997	41
20	0.0233	0.0233	42.9641	0.9997	40
21	0.0236	0.0236	42.4335	0.9997	39
22	0.0239	0.0239	41.9158	0.9997	38
23	0.0241	0.0241	41.4106	0.9997	37
24	0.0244	0.0244	40.9174	0.9997	36
25	0.0247	0.0247	40.4358	0.9997	35
26	0.0250	0.0250	39.9655	0.9997	34
27	0.0253	0.0253	39.5059	0.9997	33
28	0.0256	0.0256	39.0568	0.9997	32
29	0.0259	0.0259	38.6177	0.9997	31
30	0.0262	0.0262	38.1885	0.9997	30
31	0.0265	0.0265	37.7086	0.9996	29
32	0.0268	0.0268	37.3579	0.9996	28
33	0.0270	0.0271	36.9560	0.9996	27
34	0.0273	0.0274	36.5627	0.9996	26
35	0.0276	0.0276	36.1776	0.9996	25
36	0.0279	0.0279	35.8006	0.9996	24
37	0.0282	0.0282	35.4313	0.9996	23
38	0.0285	0.0285	35.0695	0.9996	22
39	0.0288	0.0288	34.7151	0.9996	21
40	0.0291	0.0291	34.3678	0.9996	20
41	0.0294	0.0294	34.0273	0.9996	19
42	0.0297	0.0297	33.6935	0.9996	18
43	0.0300	0.0300	33.3662	0.9996	17
44	0.0302	0.0303	33.0452	0.9995	16
45	0.0305	0.0306	32.7303	0.9995	15
46	0.0308	0.0308	32.4213	0.9995	14
47	0.0311	0.0311	32.1181	0.9995	13
48	0.0314	0.0314	31.8205	0.9995	12
49	0.0317	0.0317	31.5284	0.9995	11
50	0.0320	0.0320	31.2416	0.9995	10
51	0.0323	0.0323	30.9599	0.9995	9
52	0.0326	0.0326	30.6833	0.9995	8
53	0.0329	0.0329	30.4116	0.9995	7
54	0.0332	0.0332	30.1446	0.9995	6
55	0.0334	0.0335	29.8823	0.9994	5
56	0.0337	0.0338	29.6245	0.9994	4
57	0.0340	0.0340	29.3711	0.9994	3
58	0.0343	0.0343	29.1220	0.9994	2
59	0.0346	0.0346	28.8771	0.9994	1
60	0.0349	0.0349	28.6363	0.9994	0
	Cos	Cot	Tan	Sin	

*179 269 *359 89° NATURAL 89° *178° 268° *358

*92° 182° *272° **2°** NATURAL **3°** *93° 183° *273°

′	Sin	Tan	Cot	Cos	
0	0.0349	0.0349	28.6363	0.9994	60
1	0.0352	0.0352	28.3994	0.9994	59
2	0.0355	0.0355	28.1664	0.9994	58
3	0.0358	0.0358	27.9372	0.9994	57
4	0.0361	0.0361	27.7117	0.9993	56
5	0.0364	0.0364	27.4899	0.9993	55
6	0.0366	0.0367	27.2715	0.9993	54
7	0.0369	0.0370	27.0566	0.9993	53
8	0.0372	0.0373	26.8450	0.9993	52
9	0.0375	0.0375	26.6367	0.9993	51
10	0.0378	0.0378	26.4316	0.9993	50
11	0.0381	0.0381	26.2296	0.9993	49
12	0.0384	0.0384	26.0307	0.9993	48
13	0.0387	0.0387	25.8348	0.9993	47
14	0.0390	0.0390	25.6418	0.9992	46
15	0.0393	0.0393	25.4517	0.9992	45
16	0.0396	0.0396	25.2644	0.9992	44
17	0.0398	0.0399	25.0798	0.9992	43
18	0.0401	0.0402	24.8978	0.9992	42
19	0.0404	0.0405	24.7185	0.9992	41
20	0.0407	0.0407	24.5418	0.9992	40
21	0.0410	0.0410	24.3675	0.9992	39
22	0.0413	0.0413	24.1957	0.9991	38
23	0.0416	0.0416	24.0263	0.9991	37
24	0.0419	0.0419	23.8593	0.9991	36
25	0.0422	0.0422	23.6945	0.9991	35
26	0.0425	0.0425	23.5321	0.9991	34
27	0.0427	0.0428	23.3718	0.9991	33
28	0.0430	0.0431	23.2137	0.9991	32
29	0.0433	0.0434	23.0577	0.9991	31
30	0.0436	0.0437	22.9038	0.9990	30
31	0.0439	0.0440	22.7519	0.9990	29
32	0.0442	0.0442	22.6020	0.9990	28
33	0.0445	0.0445	22.4541	0.9990	27
34	0.0448	0.0448	22.3081	0.9990	26
35	0.0451	0.0451	22.1640	0.9990	25
36	0.0454	0.0454	22.0217	0.9990	24
37	0.0457	0.0457	21.8813	0.9990	23
38	0.0459	0.0460	21.7426	0.9989	22
39	0.0462	0.0463	21.6056	0.9989	21
40	0.0465	0.0466	21.4704	0.9989	20
41	0.0468	0.0469	21.3369	0.9989	19
42	0.0471	0.0472	21.2049	0.9989	18
43	0.0474	0.0475	21.0747	0.9989	17
44	0.0477	0.0477	20.9460	0.9989	16
45	0.0480	0.0480	20.8188	0.9988	15
46	0.0483	0.0483	20.6932	0.9988	14
47	0.0486	0.0486	20.5691	0.9988	13
48	0.0488	0.0489	20.4465	0.9988	12
49	0.0491	0.0492	20.3253	0.9988	11
50	0.0494	0.0495	20.2056	0.9988	10
51	0.0497	0.0498	20.0872	0.9988	9
52	0.0500	0.0501	19.9702	0.9987	8
53	0.0503	0.0504	19.8546	0.9987	7
54	0.0506	0.0507	19.7403	0.9987	6
55	0.0509	0.0509	19.6273	0.9987	5
56	0.0512	0.0512	19.5156	0.9987	4
57	0.0515	0.0515	19.4051	0.9987	3
58	0.0518	0.0518	19.2959	0.9987	2
59	0.0520	0.0521	19.1879	0.9986	1
60	0.0523	0.0524	19.0811	0.9986	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.0523	0.0524	19.0811	0.9986	60
1	0.0526	0.0527	18.9755	0.9986	59
2	0.0529	0.0530	18.8711	0.9986	58
3	0.0532	0.0533	18.7678	0.9986	57
4	0.0535	0.0536	18.6656	0.9986	56
5	0.0538	0.0539	18.5645	0.9986	55
6	0.0541	0.0542	18.4645	0.9985	54
7	0.0544	0.0544	18.3655	0.9985	53
8	0.0547	0.0547	18.2677	0.9985	52
9	0.0550	0.0550	18.1708	0.9985	51
10	0.0552	0.0553	18.0750	0.9985	50
11	0.0555	0.0556	17.9802	0.9985	49
12	0.0558	0.0559	17.8863	0.9984	48
13	0.0561	0.0562	17.7934	0.9984	47
14	0.0564	0.0565	17.7015	0.9984	46
15	0.0567	0.0568	17.6106	0.9984	45
16	0.0570	0.0571	17.5205	0.9984	44
17	0.0573	0.0574	17.4314	0.9984	43
18	0.0576	0.0577	17.3432	0.9983	42
19	0.0579	0.0580	17.2558	0.9983	41
20	0.0581	0.0582	17.1693	0.9983	40
21	0.0584	0.0585	17.0837	0.9983	39
22	0.0587	0.0588	16.9990	0.9983	38
23	0.0590	0.0591	16.9150	0.9983	37
24	0.0593	0.0594	16.8319	0.9982	36
25	0.0596	0.0597	16.7496	0.9982	35
26	0.0599	0.0600	16.6681	0.9982	34
27	0.0602	0.0603	16.5874	0.9982	33
28	0.0605	0.0606	16.5075	0.9982	32
29	0.0608	0.0609	16.4283	0.9982	31
30	0.0610	0.0612	16.3499	0.9981	30
31	0.0613	0.0615	16.2722	0.9981	29
32	0.0616	0.0617	16.1952	0.9981	28
33	0.0619	0.0620	16.1190	0.9981	27
34	0.0622	0.0623	16.0435	0.9981	26
35	0.0625	0.0626	15.9687	0.9980	25
36	0.0628	0.0629	15.8945	0.9980	24
37	0.0631	0.0632	15.8211	0.9980	23
38	0.0634	0.0635	15.7483	0.9980	22
39	0.0637	0.0638	15.6762	0.9980	21
40	0.0640	0.0641	15.6048	0.9980	20
41	0.0642	0.0644	15.5340	0.9979	19
42	0.0645	0.0647	15.4638	0.9979	18
43	0.0648	0.0650	15.3943	0.9979	17
44	0.0651	0.0653	15.3254	0.9979	16
45	0.0654	0.0655	15.2571	0.9979	15
46	0.0657	0.0658	15.1893	0.9978	14
47	0.0660	0.0661	15.1222	0.9978	13
48	0.0663	0.0664	15.0557	0.9978	12
49	0.0666	0.0667	14.9898	0.9978	11
50	0.0669	0.0670	14.9244	0.9978	10
51	0.0671	0.0673	14.8596	0.9977	9
52	0.0674	0.0676	14.7954	0.9977	8
53	0.0677	0.0679	14.7317	0.9977	7
54	0.0680	0.0682	14.6685	0.9977	6
55	0.0683	0.0685	14.6059	0.9977	5
56	0.0686	0.0688	14.5438	0.9976	4
57	0.0689	0.0690	14.4823	0.9976	3
58	0.0692	0.0693	14.4212	0.9976	2
59	0.0695	0.0696	14.3607	0.9976	1
60	0.0698	0.0699	14.3007	0.9976	0
	Cos	Cot	Tan	Sin	′

*177° 267° *357° **87°** NATURAL **86°** *176° 266° *356°

*94° 184° *274° 4° NATURAL 5° *95° 185° *275°

′	Sin	Tan	Cot	Cos	
0	0.0698	0.0699	14.3007	0.9976	60
1	0.0700	0.0702	14.2411	0.9975	59
2	0.0703	0.0705	14.1821	0.9975	58
3	0.0706	0.0708	14.1235	0.9975	57
4	0.0709	0.0711	14.0655	0.9975	56
5	0.0712	0.0714	14.0079	0.9975	55
6	0.0715	0.0717	13.9507	0.9974	54
7	0.0718	0.0720	13.8940	0.9974	53
8	0.0721	0.0723	13.8378	0.9974	52
9	0.0724	0.0726	13.7821	0.9974	51
10	0.0727	0.0729	13.7267	0.9974	50
11	0.0729	0.0731	13.6719	0.9973	49
12	0.0732	0.0734	13.6174	0.9973	48
13	0.0735	0.0737	13.5634	0.9973	47
14	0.0738	0.0740	13.5098	0.9973	46
15	0.0741	0.0743	13.4566	0.9973	45
16	0.0744	0.0746	13.4039	0.9972	44
17	0.0747	0.0749	13.3515	0.9972	43
18	0.0750	0.0752	13.2996	0.9972	42
19	0.0753	0.0755	13.2480	0.9972	41
20	0.0756	0.0758	13.1969	0.9971	40
21	0.0758	0.0761	13.1461	0.9971	39
22	0.0761	0.0764	13.0958	0.9971	38
23	0.0764	0.0767	13.0458	0.9971	37
24	0.0767	0.0769	12.9962	0.9971	36
25	0.0770	0.0772	12.9469	0.9970	35
26	0.0773	0.0775	12.8981	0.9970	34
27	0.0776	0.0778	12.8496	0.9970	33
28	0.0779	0.0781	12.8014	0.9970	32
29	0.0782	0.0784	12.7536	0.9969	31
30	0.0785	0.0787	12.7062	0.9969	30
31	0.0787	0.0790	12.6591	0.9969	29
32	0.0790	0.0793	12.6124	0.9969	28
33	0.0793	0.0796	12.5660	0.9968	27
34	0.0796	0.0799	12.5199	0.9968	26
35	0.0799	0.0802	12.4742	0.9968	25
36	0.0802	0.0805	12.4288	0.9968	24
37	0.0805	0.0808	12.3838	0.9968	23
38	0.0808	0.0810	12.3390	0.9967	22
39	0.0811	0.0813	12.2946	0.9967	21
40	0.0814	0.0816	12.2505	0.9967	20
41	0.0816	0.0819	12.2067	0.9967	19
42	0.0819	0.0822	12.1632	0.9966	18
43	0.0822	0.0825	12.1201	0.9966	17
44	0.0825	0.0828	12.0772	0.9966	16
45	0.0828	0.0831	12.0346	0.9966	15
46	0.0831	0.0834	11.9923	0.9965	14
47	0.0834	0.0837	11.9504	0.9965	13
48	0.0837	0.0840	11.9087	0.9965	12
49	0.0840	0.0843	11.8673	0.9965	11
50	0.0843	0.0846	11.8262	0.9964	10
51	0.0845	0.0849	11.7853	0.9964	9
52	0.0848	0.0851	11.7448	0.9964	8
53	0.0851	0.0854	11.7045	0.9964	7
54	0.0854	0.0857	11.6645	0.9963	6
55	0.0857	0.0860	11.6248	0.9963	5
56	0.0860	0.0863	11.5853	0.9963	4
57	0.0863	0.0866	11.5461	0.9963	3
58	0.0866	0.0869	11.5072	0.9962	2
59	0.0869	0.0872	11.4685	0.9962	1
60	0.0872	0.0875	11.4301	0.9962	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.0872	0.0875	11.4301	0.9962	60
1	0.0874	0.0878	11.3919	0.9962	59
2	0.0877	0.0881	11.3540	0.9961	58
3	0.0880	0.0884	11.3163	0.9961	57
4	0.0883	0.0887	11.2789	0.9961	56
5	0.0886	0.0890	11.2417	0.9961	55
6	0.0889	0.0892	11.2048	0.9960	54
7	0.0892	0.0895	11.1681	0.9960	53
8	0.0895	0.0898	11.1316	0.9960	52
9	0.0898	0.0901	11.0954	0.9960	51
10	0.0901	0.0904	11.0594	0.9959	50
11	0.0903	0.0907	11.0237	0.9959	49
12	0.0906	0.0910	10.9882	0.9959	48
13	0.0909	0.0913	10.9529	0.9959	47
14	0.0912	0.0916	10.9178	0.9958	46
15	0.0915	0.0919	10.8829	0.9958	45
16	0.0918	0.0922	10.8483	0.9958	44
17	0.0921	0.0925	10.8139	0.9958	43
18	0.0924	0.0928	10.7797	0.9957	42
19	0.0927	0.0931	10.7457	0.9957	41
20	0.0929	0.0934	10.7119	0.9957	40
21	0.0932	0.0936	10.6783	0.9956	39
22	0.0935	0.0939	10.6450	0.9956	38
23	0.0938	0.0942	10.6118	0.9956	37
24	0.0941	0.0945	10.5789	0.9956	36
25	0.0944	0.0948	10.5462	0.9955	35
26	0.0947	0.0951	10.5136	0.9955	34
27	0.0950	0.0954	10.4813	0.9955	33
28	0.0953	0.0957	10.4491	0.9955	32
29	0.0956	0.0960	10.4172	0.9954	31
30	0.0958	0.0963	10.3854	0.9954	30
31	0.0961	0.0966	10.3538	0.9954	29
32	0.0964	0.0969	10.3224	0.9953	28
33	0.0967	0.0972	10.2913	0.9953	27
34	0.0970	0.0975	10.2602	0.9953	26
35	0.0973	0.0978	10.2294	0.9953	25
36	0.0976	0.0981	10.1988	0.9952	24
37	0.0979	0.0983	10.1683	0.9952	23
38	0.0982	0.0986	10.1381	0.9952	22
39	0.0985	0.0989	10.1080	0.9951	21
40	0.0987	0.0992	10.0780	0.9951	20
41	0.0990	0.0995	10.0483	0.9951	19
42	0.0993	0.0998	10.0187	0.9951	18
43	0.0996	0.1001	9.9893	0.9950	17
44	0.0999	0.1004	9.9601	0.9950	16
45	0.1002	0.1007	9.9310	0.9950	15
46	0.1005	0.1010	9.9021	0.9949	14
47	0.1008	0.1013	9.8734	0.9949	13
48	0.1011	0.1016	9.8448	0.9949	12
49	0.1013	0.1019	9.8164	0.9949	11
50	0.1016	0.1022	9.7882	0.9948	10
51	0.1019	0.1025	9.7601	0.9948	9
52	0.1022	0.1028	9.7322	0.9948	8
53	0.1025	0.1030	9.7044	0.9947	7
54	0.1028	0.1033	9.6768	0.9947	6
55	0.1031	0.1036	9.6493	0.9947	5
56	0.1034	0.1039	9.6220	0.9946	4
57	0.1037	0.1042	9.5949	0.9946	3
58	0.1039	0.1045	9.5679	0.9946	2
59	0.1042	0.1048	9.5411	0.9946	1
60	0.1045	0.1051	9.5144	0.9945	0
	Cos	Cot	Tan	Sin	′

*175 265 *355° 85° NATURAL 84°*174° 264° *354

*96° 186° *276° 6° NATURAL 7° *97° 187° *277°

′	Sin	Tan	Cot	Cos	
0	0.1045	0.1051	9.5144	0.9945	60
1	0.1048	0.1054	9.4878	0.9945	59
2	0.1051	0.1057	9.4614	0.9945	58
3	0.1054	0.1060	9.4352	0.9944	57
4	0.1057	0.1063	9.4090	0.9944	56
5	0.1060	0.1066	9.3831	0.9944	55
6	0.1063	0.1069	9.3572	0.9943	54
7	0.1066	0.1072	9.3315	0.9943	53
8	0.1068	0.1075	9.3060	0.9943	52
9	0.1071	0.1078	9.2806	0.9942	51
10	0.1074	0.1080	9.2553	0.9942	50
11	0.1077	0.1083	9.2302	0.9942	49
12	0.1080	0.1086	9.2052	0.9942	48
13	0.1083	0.1089	9.1803	0.9941	47
14	0.1086	0.1092	9.1555	0.9941	46
15	0.1089	0.1095	9.1309	0.9941	45
16	0.1092	0.1098	9.1065	0.9940	44
17	0.1094	0.1101	9.0821	0.9940	43
18	0.1097	0.1104	9.0579	0.9940	42
19	0.1100	0.1107	9.0338	0.9939	41
20	0.1103	0.1110	9.0098	0.9939	40
21	0.1106	0.1113	8.9860	0.9939	39
22	0.1109	0.1116	8.9623	0.9938	38
23	0.1112	0.1119	8.9387	0.9938	37
24	0.1115	0.1122	8.9152	0.9938	36
25	0.1118	0.1125	8.8919	0.9937	35
26	0.1120	0.1128	8.8686	0.9937	34
27	0.1123	0.1131	8.8455	0.9937	33
28	0.1126	0.1133	8.8225	0.9936	32
29	0.1129	0.1136	8.7996	0.9936	31
30	0.1132	0.1139	8.7769	0.9936	30
31	0.1135	0.1142	8.7542	0.9935	29
32	0.1138	0.1145	8.7317	0.9935	28
33	0.1141	0.1148	8.7093	0.9935	27
34	0.1144	0.1151	8.6870	0.9934	26
35	0.1146	0.1154	8.6648	0.9934	25
36	0.1149	0.1157	8.6427	0.9934	24
37	0.1152	0.1160	8.6208	0.9933	23
38	0.1155	0.1163	8.5989	0.9933	22
39	0.1158	0.1166	8.5772	0.9933	21
40	0.1161	0.1169	8.5555	0.9932	20
41	0.1164	0.1172	8.5340	0.9932	19
42	0.1167	0.1175	8.5126	0.9932	18
43	0.1170	0.1178	8.4913	0.9931	17
44	0.1172	0.1181	8.4701	0.9931	16
45	0.1175	0.1184	8.4490	0.9931	15
46	0.1178	0.1187	8.4280	0.9930	14
47	0.1181	0.1189	8.4071	0.9930	13
48	0.1184	0.1192	8.3863	0.9930	12
49	0.1187	0.1195	8.3656	0.9929	11
50	0.1190	0.1198	8.3450	0.9929	10
51	0.1193	0.1201	8.3245	0.9929	9
52	0.1196	0.1204	8.3041	0.9928	8
53	0.1198	0.1207	8.2838	0.9928	7
54	0.1201	0.1210	8.2636	0.9928	6
55	0.1204	0.1213	8.2434	0.9927	5
56	0.1207	0.1216	8.2234	0.9927	4
57	0.1210	0.1219	8.2035	0.9927	3
58	0.1213	0.1222	8.1837	0.9926	2
59	0.1216	0.1225	8.1640	0.9926	1
60	0.1219	0.1228	8.1443	0.9925	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.1219	0.1228	8.1443	0.9925	60
1	0.1222	0.1231	8.1248	0.9925	59
2	0.1224	0.1234	8.1054	0.9925	58
3	0.1227	0.1237	8.0860	0.9924	57
4	0.1230	0.1240	8.0667	0.9924	56
5	0.1233	0.1243	8.0476	0.9924	55
6	0.1236	0.1246	8.0285	0.9923	54
7	0.1239	0.1249	8.0095	0.9923	53
8	0.1242	0.1251	7.9906	0.9923	52
9	0.1245	0.1254	7.9718	0.9922	51
10	0.1248	0.1257	7.9530	0.9922	50
11	0.1250	0.1260	7.9344	0.9922	49
12	0.1253	0.1263	7.9158	0.9921	48
13	0.1256	0.1266	7.8973	0.9921	47
14	0.1259	0.1269	7.8789	0.9920	46
15	0.1262	0.1272	7.8606	0.9920	45
16	0.1265	0.1275	7.8424	0.9920	44
17	0.1268	0.1278	7.8243	0.9919	43
18	0.1271	0.1281	7.8062	0.9919	42
19	0.1274	0.1284	7.7882	0.9919	41
20	0.1276	0.1287	7.7704	0.9918	40
21	0.1279	0.1290	7.7525	0.9918	39
22	0.1282	0.1293	7.7348	0.9917	38
23	0.1285	0.1296	7.7171	0.9917	37
24	0.1288	0.1299	7.6996	0.9917	36
25	0.1291	0.1302	7.6821	0.9916	35
26	0.1294	0.1305	7.6647	0.9916	34
27	0.1297	0.1308	7.6473	0.9916	33
28	0.1299	0.1311	7.6301	0.9915	32
29	0.1302	0.1314	7.6129	0.9915	31
30	0.1305	0.1317	7.5958	0.9914	30
31	0.1308	0.1319	7.5787	0.9914	29
32	0.1311	0.1322	7.5618	0.9914	28
33	0.1314	0.1325	7.5449	0.9913	27
34	0.1317	0.1328	7.5281	0.9913	26
35	0.1320	0.1331	7.5113	0.9913	25
36	0.1323	0.1334	7.4947	0.9912	24
37	0.1325	0.1337	7.4781	0.9912	23
38	0.1328	0.1340	7.4615	0.9911	22
39	0.1331	0.1343	7.4451	0.9911	21
40	0.1334	0.1346	7.4287	0.9911	20
41	0.1337	0.1349	7.4124	0.9910	19
42	0.1340	0.1352	7.3962	0.9910	18
43	0.1343	0.1355	7.3800	0.9909	17
44	0.1346	0.1358	7.3639	0.9909	16
45	0.1349	0.1361	7.3479	0.9909	15
46	0.1351	0.1364	7.3319	0.9908	14
47	0.1354	0.1367	7.3160	0.9908	13
48	0.1357	0.1370	7.3002	0.9907	12
49	0.1360	0.1373	7.2844	0.9907	11
50	0.1363	0.1376	7.2687	0.9907	10
51	0.1366	0.1379	7.2531	0.9906	9
52	0.1369	0.1382	7.2375	0.9906	8
53	0.1372	0.1385	7.2220	0.9905	7
54	0.1374	0.1388	7.2066	0.9905	6
55	0.1377	0.1391	7.1912	0.9905	5
56	0.1380	0.1394	7.1759	0.9904	4
57	0.1383	0.1397	7.1607	0.9904	3
58	0.1386	0.1399	7.1455	0.9903	2
59	0.1389	0.1402	7.1304	0.9903	1
60	0.1392	0.1405	7.1154	0.9903	0
	Cos	Cot	Tan	Sin	′

*173° 263° *353° 83° NATURAL 82° *172° 262° *352°

*98° 188° *278° **8°** NATURAL **9°** *99° 189° *279°

′	Sin	Tan	Cot	Cos	
0	0.1392	0.1405	7.1154	0.9903	60
1	0.1395	0.1408	7.1004	0.9902	59
2	0.1397	0.1411	7.0855	0.9902	58
3	0.1400	0.1414	7.0706	0.9901	57
4	0.1403	0.1417	7.0558	0.9901	56
5	0.1406	0.1420	7.0410	0.9901	55
6	0.1409	0.1423	7.0264	0.9900	54
7	0.1412	0.1426	7.0117	0.9900	53
8	0.1415	0.1429	6.9972	0.9899	52
9	0.1418	0.1432	6.9827	0.9899	51
10	0.1421	0.1435	6.9682	0.9899	50
11	0.1423	0.1438	6.9538	0.9898	49
12	0.1426	0.1441	6.9395	0.9898	48
13	0.1429	0.1444	6.9252	0.9897	47
14	0.1432	0.1447	6.9110	0.9897	46
15	0.1435	0.1450	6.8969	0.9897	45
16	0.1438	0.1453	6.8828	0.9896	44
17	0.1441	0.1456	6.8687	0.9896	43
18	0.1444	0.1459	6.8548	0.9895	42
19	0.1446	0.1462	6.8408	0.9895	41
20	0.1449	0.1465	6.8269	0.9894	40
21	0.1452	0.1468	6.8131	0.9894	39
22	0.1455	0.1471	6.7994	0.9894	38
23	0.1458	0.1474	6.7856	0.9893	37
24	0.1461	0.1477	6.7720	0.9893	36
25	0.1464	0.1480	6.7584	0.9892	35
26	0.1467	0.1483	6.7448	0.9892	34
27	0.1469	0.1486	6.7313	0.9891	33
28	0.1472	0.1489	6.7179	0.9891	32
29	0.1475	0.1492	6.7045	0.9891	31
30	0.1478	0.1495	6.6912	0.9890	30
31	0.1481	0.1497	6.6779	0.9890	29
32	0.1484	0.1500	6.6646	0.9889	28
33	0.1487	0.1503	6.6514	0.9889	27
34	0.1490	0.1506	6.6383	0.9888	26
35	0.1492	0.1509	6.6252	0.9888	25
36	0.1495	0.1512	6.6122	0.9888	24
37	0.1498	0.1515	6.5992	0.9887	23
38	0.1501	0.1518	6.5863	0.9887	22
39	0.1504	0.1521	6.5734	0.9886	21
40	0.1507	0.1524	6.5606	0.9886	20
41	0.1510	0.1527	6.5478	0.9885	19
42	0.1513	0.1530	6.5350	0.9885	18
43	0.1515	0.1533	6.5223	0.9884	17
44	0.1518	0.1536	6.5097	0.9884	16
45	0.1521	0.1539	6.4971	0.9884	15
46	0.1524	0.1542	6.4846	0.9883	14
47	0.1527	0.1545	6.4721	0.9883	13
48	0.1530	0.1548	6.4596	0.9882	12
49	0.1533	0.1551	6.4472	0.9882	11
50	0.1536	0.1554	6.4348	0.9881	10
51	0.1538	0.1557	6.4225	0.9881	9
52	0.1541	0.1560	6.4103	0.9880	8
53	0.1544	0.1563	6.3980	0.9880	7
54	0.1547	0.1566	6.3859	0.9880	6
55	0.1550	0.1569	6.3737	0.9879	5
56	0.1553	0.1572	6.3617	0.9879	4
57	0.1556	0.1575	6.3496	0.9878	3
58	0.1559	0.1578	6.3376	0.9878	2
59	0.1561	0.1581	6.3257	0.9877	1
60	0.1564	0.1584	6.3138	0.9877	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.1564	0.1584	6.3138	0.9877	60
1	0.1567	0.1587	6.3019	0.9876	59
2	0.1570	0.1590	6.2901	0.9876	58
3	0.1573	0.1593	6.2783	0.9876	57
4	0.1576	0.1596	6.2666	0.9875	56
5	0.1579	0.1599	6.2549	0.9875	55
6	0.1582	0.1602	6.2432	0.9874	54
7	0.1584	0.1605	6.2316	0.9874	53
8	0.1587	0.1608	6.2200	0.9873	52
9	0.1590	0.1611	6.2085	0.9873	51
10	0.1593	0.1614	6.1970	0.9872	50
11	0.1596	0.1617	6.1856	0.9872	49
12	0.1599	0.1620	6.1742	0.9871	48
13	0.1602	0.1623	6.1628	0.9871	47
14	0.1605	0.1626	6.1515	0.9870	46
15	0.1607	0.1629	6.1402	0.9870	45
16	0.1610	0.1632	6.1290	0.9869	44
17	0.1613	0.1635	6.1178	0.9869	43
18	0.1616	0.1638	6.1066	0.9869	42
19	0.1619	0.1641	6.0955	0.9868	41
20	0.1622	0.1644	6.0844	0.9868	40
21	0.1625	0.1647	6.0734	0.9867	39
22	0.1628	0.1650	6.0624	0.9867	38
23	0.1630	0.1653	6.0514	0.9866	37
24	0.1633	0.1655	6.0405	0.9866	36
25	0.1636	0.1658	6.0296	0.9865	35
26	0.1639	0.1661	6.0188	0.9865	34
27	0.1642	0.1664	6.0080	0.9864	33
28	0.1645	0.1667	5.9972	0.9864	32
29	0.1648	0.1670	5.9865	0.9863	31
30	0.1650	0.1673	5.9758	0.9863	30
31	0.1653	0.1676	5.9651	0.9862	29
32	0.1656	0.1679	5.9545	0.9862	28
33	0.1659	0.1682	5.9439	0.9861	27
34	0.1662	0.1685	5.9333	0.9861	26
35	0.1665	0.1688	5.9228	0.9860	25
36	0.1668	0.1691	5.9124	0.9860	24
37	0.1671	0.1694	5.9019	0.9859	23
38	0.1673	0.1697	5.8915	0.9859	22
39	0.1676	0.1700	5.8811	0.9859	21
40	0.1679	0.1703	5.8708	0.9858	20
41	0.1682	0.1706	5.8605	0.9858	19
42	0.1685	0.1709	5.8502	0.9857	18
43	0.1688	0.1712	5.8400	0.9857	17
44	0.1691	0.1715	5.8298	0.9856	16
45	0.1693	0.1718	5.8197	0.9856	15
46	0.1696	0.1721	5.8095	0.9855	14
47	0.1699	0.1724	5.7994	0.9855	13
48	0.1702	0.1727	5.7894	0.9854	12
49	0.1705	0.1730	5.7794	0.9854	11
50	0.1708	0.1733	5.7694	0.9853	10
51	0.1711	0.1736	5.7594	0.9853	9
52	0.1714	0.1739	5.7495	0.9852	8
53	0.1716	0.1742	5.7396	0.9852	7
54	0.1719	0.1745	5.7297	0.9851	6
55	0.1722	0.1748	5.7199	0.9851	5
56	0.1725	0.1751	5.7101	0.9850	4
57	0.1728	0.1754	5.7004	0.9850	3
58	0.1731	0.1757	5.6906	0.9849	2
59	0.1734	0.1760	5.6809	0.9849	1
60	0.1736	0.1763	5.6713	0.9848	0
	Cos	Cot	Tan	Sin	′

*171° 261° *351° **81°** NATURAL **80°** *170° 260° *350°

*100° 190° *280° **10°** NATURAL **11°** *101° 191° *281°

′	Sin	Tan	Cot	Cos	
0	0.1736	0.1763	5.6713	0.9848	60
1	0.1739	0.1766	5.6617	0.9848	59
2	0.1742	0.1769	5.6521	0.9847	58
3	0.1745	0.1772	5.6425	0.9847	57
4	0.1748	0.1775	5.6329	0.9846	56
5	0.1751	0.1778	5.6234	0.9846	55
6	0.1754	0.1781	5.6140	0.9845	54
7	0.1757	0.1784	5.6045	0.9845	53
8	0.1759	0.1787	5.5951	0.9844	52
9	0.1762	0.1790	5.5857	0.9843	51
10	0.1765	0.1793	5.5764	0.9843	50
11	0.1768	0.1796	5.5671	0.9842	49
12	0.1771	0.1799	5.5578	0.9842	48
13	0.1774	0.1802	5.5485	0.9841	47
14	0.1777	0.1805	5.5393	0.9841	46
15	0.1779	0.1808	5.5301	0.9840	45
16	0.1782	0.1811	5.5209	0.9840	44
17	0.1785	0.1814	5.5118	0.9839	43
18	0.1788	0.1817	5.5026	0.9839	42
19	0.1791	0.1820	5.4936	0.9838	41
20	0.1794	0.1823	5.4845	0.9838	40
21	0.1797	0.1826	5.4755	0.9837	39
22	0.1799	0.1829	5.4665	0.9837	38
23	0.1802	0.1832	5.4575	0.9836	37
24	0.1805	0.1835	5.4486	0.9836	36
25	0.1808	0.1838	5.4397	0.9835	35
26	0.1811	0.1841	5.4308	0.9835	34
27	0.1814	0.1844	5.4219	0.9834	33
28	0.1817	0.1847	5.4131	0.9834	32
29	0.1819	0.1850	5.4043	0.9833	31
30	0.1822	0.1853	5.3955	0.9833	30
31	0.1825	0.1856	5.3868	0.9832	29
32	0.1828	0.1859	5.3781	0.9831	28
33	0.1831	0.1862	5.3694	0.9831	27
34	0.1834	0.1865	5.3607	0.9830	26
35	0.1837	0.1868	5.3521	0.9830	25
36	0.1840	0.1871	5.3435	0.9829	24
37	0.1842	0.1874	5.3349	0.9829	23
38	0.1845	0.1877	5.3263	0.9828	22
39	0.1848	0.1880	5.3178	0.9828	21
40	0.1851	0.1883	5.3093	0.9827	20
41	0.1854	0.1887	5.3008	0.9827	19
42	0.1857	0.1890	5.2924	0.9826	18
43	0.1860	0.1893	5.2839	0.9826	17
44	0.1862	0.1896	5.2755	0.9825	16
45	0.1865	0.1899	5.2672	0.9825	15
46	0.1868	0.1902	5.2588	0.9824	14
47	0.1871	0.1905	5.2505	0.9823	13
48	0.1874	0.1908	5.2422	0.9823	12
49	0.1877	0.1911	5.2339	0.9822	11
50	0.1880	0.1914	5.2257	0.9822	10
51	0.1882	0.1917	5.2174	0.9821	9
52	0.1885	0.1920	5.2092	0.9821	8
53	0.1888	0.1923	5.2011	0.9820	7
54	0.1891	0.1926	5.1929	0.9820	6
55	0.1894	0.1929	5.1848	0.9819	5
56	0.1897	0.1932	5.1767	0.9818	4
57	0.1900	0.1935	5.1686	0.9818	3
58	0.1902	0.1938	5.1606	0.9817	2
59	0.1905	0.1941	5.1526	0.9817	1
60	0.1908	0.1944	5.1446	0.9816	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.1908	0.1944	5.1446	0.9816	60
1	0.1911	0.1947	5.1366	0.9816	59
2	0.1914	0.1950	5.1286	0.9815	58
3	0.1917	0.1953	5.1207	0.9815	57
4	0.1920	0.1956	5.1128	0.9814	56
5	0.1922	0.1959	5.1049	0.9813	55
6	0.1925	0.1962	5.0970	0.9813	54
7	0.1928	0.1965	5.0892	0.9812	53
8	0.1931	0.1968	5.0814	0.9812	52
9	0.1934	0.1971	5.0736	0.9811	51
10	0.1937	0.1974	5.0658	0.9811	50
11	0.1939	0.1977	5.0581	0.9810	49
12	0.1942	0.1980	5.0504	0.9810	48
13	0.1945	0.1983	5.0427	0.9809	47
14	0.1948	0.1986	5.0350	0.9808	46
15	0.1951	0.1989	5.0273	0.9808	45
16	0.1954	0.1992	5.0197	0.9807	44
17	0.1957	0.1995	5.0121	0.9807	43
18	0.1959	0.1998	5.0045	0.9806	42
19	0.1962	0.2001	4.9969	0.9806	41
20	0.1965	0.2004	4.9894	0.9805	40
21	0.1968	0.2007	4.9819	0.9804	39
22	0.1971	0.2010	4.9744	0.9804	38
23	0.1974	0.2013	4.9669	0.9803	37
24	0.1977	0.2016	4.9594	0.9803	36
25	0.1979	0.2019	4.9520	0.9802	35
26	0.1982	0.2022	4.9446	0.9802	34
27	0.1985	0.2025	4.9372	0.9801	33
28	0.1988	0.2028	4.9298	0.9800	32
29	0.1991	0.2031	4.9225	0.9800	31
30	0.1994	0.2035	4.9152	0.9799	30
31	0.1997	0.2038	4.9078	0.9799	29
32	0.1999	0.2041	4.9006	0.9798	28
33	0.2002	0.2044	4.8933	0.9798	27
34	0.2005	0.2047	4.8860	0.9797	26
35	0.2008	0.2050	4.8788	0.9796	25
36	0.2011	0.2053	4.8716	0.9796	24
37	0.2014	0.2056	4.8644	0.9795	23
38	0.2016	0.2059	4.8573	0.9795	22
39	0.2019	0.2062	4.8501	0.9794	21
40	0.2022	0.2065	4.8430	0.9793	20
41	0.2025	0.2068	4.8359	0.9793	19
42	0.2028	0.2071	4.8288	0.9792	18
43	0.2031	0.2074	4.8218	0.9792	17
44	0.2034	0.2077	4.8147	0.9791	16
45	0.2036	0.2080	4.8077	0.9790	15
46	0.2039	0.2083	4.8007	0.9790	14
47	0.2042	0.2086	4.7937	0.9789	13
48	0.2045	0.2089	4.7867	0.9789	12
49	0.2048	0.2092	4.7798	0.9788	11
50	0.2051	0.2095	4.7729	0.9787	10
51	0.2054	0.2098	4.7659	0.9787	9
52	0.2056	0.2101	4.7591	0.9786	8
53	0.2059	0.2104	4.7522	0.9786	7
54	0.2062	0.2107	4.7453	0.9785	6
55	0.2065	0.2110	4.7385	0.9784	5
56	0.2068	0.2113	4.7317	0.9784	4
57	0.2071	0.2116	4.7249	0.9783	3
58	0.2073	0.2119	4.7181	0.9783	2
59	0.2076	0.2123	4.7114	0.9782	1
60	0.2079	0.2126	4.7046	0.9781	0
	Cos	Cot	Tan	Sin	

*169° 259° *349° **79°** NATURAL **78°** *168° 258° *348°

*102° 192° *282° **12°** NATURAL **13°** *103° 193° *283°

	Sin	Tan	Cot	Cos	
0	0.2079	0.2126	4.7046	0.9781	60
1	0.2082	0.2129	4.6979	0.9781	59
2	0.2085	0.2132	4.6912	0.9780	58
3	0.2088	0.2135	4.6845	0.9780	57
4	0.2090	0.2138	4.6779	0.9779	56
5	0.2093	0.2141	4.6712	0.9778	55
6	0.2096	0.2144	4.6646	0.9778	54
7	0.2099	0.2147	4.6580	0.9777	53
8	0.2102	0.2150	4.6514	0.9777	52
9	0.2105	0.2153	4.6448	0.9776	51
10	0.2108	0.2156	4.6382	0.9775	50
11	0.2110	0.2159	4.6317	0.9775	49
12	0.2113	0.2162	4.6252	0.9774	48
13	0.2116	0.2165	4.6187	0.9774	47
14	0.2119	0.2168	4.6122	0.9773	46
15	0.2122	0.2171	4.6057	0.9772	45
16	0.2125	0.2174	4.5993	0.9772	44
17	0.2127	0.2177	4.5928	0.9771	43
18	0.2130	0.2180	4.5864	0.9770	42
19	0.2133	0.2183	4.5800	0.9770	41
20	0.2136	0.2186	4.5736	0.9769	40
21	0.2139	0.2189	4.5673	0.9769	39
22	0.2142	0.2193	4.5609	0.9768	38
23	0.2145	0.2196	4.5546	0.9767	37
24	0.2147	0.2199	4.5483	0.9767	36
25	0.2150	0.2202	4.5420	0.9766	35
26	0.2153	0.2205	4.5357	0.9765	34
27	0.2156	0.2208	4.5294	0.9765	33
28	0.2159	0.2211	4.5232	0.9764	32
29	0.2162	0.2214	4.5169	0.9764	31
30	0.2164	0.2217	4.5107	0.9763	30
31	0.2167	0.2220	4.5045	0.9762	29
32	0.2170	0.2223	4.4983	0.9762	28
33	0.2173	0.2226	4.4922	0.9761	27
34	0.2176	0.2229	4.4860	0.9760	26
35	0.2179	0.2232	4.4799	0.9760	25
36	0.2181	0.2235	4.4737	0.9759	24
37	0.2184	0.2238	4.4676	0.9759	23
38	0.2187	0.2241	4.4615	0.9758	22
39	0.2190	0.2244	4.4555	0.9757	21
40	0.2193	0.2247	4.4494	0.9757	20
41	0.2196	0.2251	4.4434	0.9756	19
42	0.2198	0.2254	4.4373	0.9755	18
43	0.2201	0.2257	4.4313	0.9755	17
44	0.2204	0.2260	4.4253	0.9754	16
45	0.2207	0.2263	4.4194	0.9753	15
46	0.2210	0.2266	4.4134	0.9753	14
47	0.2213	0.2269	4.4075	0.9752	13
48	0.2215	0.2272	4.4015	0.9751	12
49	0.2218	0.2275	4.3956	0.9751	11
50	0.2221	0.2278	4.3897	0.9750	10
51	0.2224	0.2281	4.3838	0.9750	9
52	0.2227	0.2284	4.3779	0.9749	8
53	0.2230	0.2287	4.3721	0.9748	7
54	0.2233	0.2290	4.3662	0.9748	6
55	0.2235	0.2293	4.3604	0.9747	5
56	0.2238	0.2296	4.3546	0.9746	4
57	0.2241	0.2299	4.3488	0.9746	3
58	0.2244	0.2303	4.3430	0.9745	2
59	0.2247	0.2306	4.3372	0.9744	1
60	0.2250	0.2309	4.3315	0.9744	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.2250	0.2309	4.3315	0.9744	60
1	0.2252	0.2312	4.3257	0.9743	59
2	0.2255	0.2315	4.3200	0.9742	58
3	0.2258	0.2318	4.3143	0.9742	57
4	0.2261	0.2321	4.3086	0.9741	56
5	0.2264	0.2324	4.3029	0.9740	55
6	0.2267	0.2327	4.2972	0.9740	54
7	0.2269	0.2330	4.2916	0.9739	53
8	0.2272	0.2333	4.2859	0.9738	52
9	0.2275	0.2336	4.2803	0.9738	51
10	0.2278	0.2339	4.2747	0.9737	50
11	0.2281	0.2342	4.2691	0.9736	49
12	0.2284	0.2345	4.2635	0.9736	48
13	0.2286	0.2349	4.2580	0.9735	47
14	0.2289	0.2352	4.2524	0.9734	46
15	0.2292	0.2355	4.2468	0.9734	45
16	0.2295	0.2358	4.2413	0.9733	44
17	0.2298	0.2361	4.2358	0.9732	43
18	0.2300	0.2364	4.2303	0.9732	42
19	0.2303	0.2367	4.2248	0.9731	41
20	0.2306	0.2370	4.2193	0.9730	40
21	0.2309	0.2373	4.2139	0.9730	39
22	0.2312	0.2376	4.2084	0.9729	38
23	0.2315	0.2379	4.2030	0.9728	37
24	0.2317	0.2382	4.1976	0.9728	36
25	0.2320	0.2385	4.1922	0.9727	35
26	0.2323	0.2388	4.1868	0.9726	34
27	0.2326	0.2392	4.1814	0.9726	33
28	0.2329	0.2395	4.1760	0.9725	32
29	0.2332	0.2398	4.1706	0.9724	31
30	0.2334	0.2401	4.1653	0.9724	30
31	0.2337	0.2404	4.1600	0.9723	29
32	0.2340	0.2407	4.1547	0.9722	28
33	0.2343	0.2410	4.1493	0.9722	27
34	0.2346	0.2413	4.1441	0.9721	26
35	0.2349	0.2416	4.1388	0.9720	25
36	0.2351	0.2419	4.1335	0.9720	24
37	0.2354	0.2422	4.1282	0.9719	23
38	0.2357	0.2425	4.1230	0.9718	22
39	0.2360	0.2428	4.1178	0.9718	21
40	0.2363	0.2432	4.1126	0.9717	20
41	0.2366	0.2435	4.1074	0.9716	19
42	0.2368	0.2438	4.1022	0.9715	18
43	0.2371	0.2441	4.0970	0.9715	17
44	0.2374	0.2444	4.0918	0.9714	16
45	0.2377	0.2447	4.0867	0.9713	15
46	0.2380	0.2450	4.0815	0.9713	14
47	0.2383	0.2453	4.0764	0.9712	13
48	0.2385	0.2456	4.0713	0.9711	12
49	0.2388	0.2459	4.0662	0.9711	11
50	0.2391	0.2462	4.0611	0.9710	10
51	0.2394	0.2465	4.0560	0.9709	9
52	0.2397	0.2469	4.0509	0.9709	8
53	0.2399	0.2472	4.0459	0.9708	7
54	0.2402	0.2475	4.0408	0.9707	6
55	0.2405	0.2478	4.0358	0.9706	5
56	0.2408	0.2481	4.0308	0.9706	4
57	0.2411	0.2484	4.0257	0.9705	3
58	0.2414	0.2487	4.0207	0.9704	2
59	0.2416	0.2490	4.0158	0.9704	1
60	0.2419	0.2493	4.0108	0.9703	0
	Cos	Cot	Tan	Sin	′

*167° 257° *347° **77°** NATURAL **76°** *166° 256° *346°

*104° 194° *284° **14°** NATURAL **15°** *105° 195° *285°

′	Sin	Tan	Cot	Cos	
0	0.2419	0.2493	4.0108	0.9703	60
1	0.2422	0.2496	4.0058	0.9702	59
2	0.2425	0.2499	4.0009	0.9702	58
3	0.2428	0.2503	3.9959	0.9701	57
4	0.2431	0.2506	3.9910	0.9700	56
5	0.2433	0.2509	3.9861	0.9699	55
6	0.2436	0.2512	3.9812	0.9699	54
7	0.2439	0.2515	3.9763	0.9698	53
8	0.2442	0.2518	3.9714	0.9697	52
9	0.2445	0.2521	3.9665	0.9697	51
10	0.2447	0.2524	3.9617	0.9696	50
11	0.2450	0.2527	3.9568	0.9695	49
12	0.2453	0.2530	3.9520	0.9694	48
13	0.2456	0.2533	3.9471	0.9694	47
14	0.2459	0.2537	3.9423	0.9693	46
15	0.2462	0.2540	3.9375	0.9692	45
16	0.2464	0.2543	3.9327	0.9692	44
17	0.2467	0.2546	3.9279	0.9691	43
18	0.2470	0.2549	3.9232	0.9690	42
19	0.2473	0.2552	3.9184	0.9689	41
20	0.2476	0.2555	3.9136	0.9689	40
21	0.2478	0.2558	3.9089	0.9688	39
22	0.2481	0.2561	3.9042	0.9687	38
23	0.2484	0.2564	3.8995	0.9687	37
24	0.2487	0.2568	3.8947	0.9686	36
25	0.2490	0.2571	3.8900	0.9685	35
26	0.2493	0.2574	3.8854	0.9684	34
27	0.2495	0.2577	3.8807	0.9684	33
28	0.2498	0.2580	3.8760	0.9683	32
29	0.2501	0.2583	3.8714	0.9682	31
30	0.2504	0.2586	3.8667	0.9681	30
31	0.2507	0.2589	3.8621	0.9681	29
32	0.2509	0.2592	3.8575	0.9680	28
33	0.2512	0.2595	3.8528	0.9679	27
34	0.2515	0.2599	3.8482	0.9679	26
35	0.2518	0.2602	3.8436	0.9678	25
36	0.2521	0.2605	3.8391	0.9677	24
37	0.2524	0.2608	3.8345	0.9676	23
38	0.2526	0.2611	3.8299	0.9676	22
39	0.2529	0.2614	3.8254	0.9675	21
40	0.2532	0.2617	3.8208	0.9674	20
41	0.2535	0.2620	3.8163	0.9673	19
42	0.2538	0.2623	3.8118	0.9673	18
43	0.2540	0.2627	3.8073	0.9672	17
44	0.2543	0.2630	3.8028	0.9671	16
45	0.2546	0.2633	3.7983	0.9670	15
46	0.2549	0.2636	3.7938	0.9670	14
47	0.2552	0.2639	3.7893	0.9669	13
48	0.2554	0.2642	3.7848	0.9668	12
49	0.2557	0.2645	3.7804	0.9667	11
50	0.2560	0.2648	3.7760	0.9667	10
51	0.2563	0.2651	3.7715	0.9666	9
52	0.2566	0.2655	3.7671	0.9665	8
53	0.2569	0.2658	3.7627	0.9665	7
54	0.2571	0.2661	3.7583	0.9664	6
55	0.2574	0.2664	3.7539	0.9663	5
56	0.2577	0.2667	3.7495	0.9662	4
57	0.2580	0.2670	3.7451	0.9662	3
58	0.2583	0.2673	3.7408	0.9661	2
59	0.2585	0.2676	3.7364	0.9660	1
60	0.2588	0.2679	3.7321	0.9659	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.2588	0.2679	3.7321	0.9659	60
1	0.2591	0.2683	3.7277	0.9659	59
2	0.2594	0.2686	3.7234	0.9658	58
3	0.2597	0.2689	3.7191	0.9657	57
4	0.2599	0.2692	3.7148	0.9656	56
5	0.2602	0.2695	3.7105	0.9655	55
6	0.2605	0.2698	3.7062	0.9655	54
7	0.2608	0.2701	3.7019	0.9654	53
8	0.2611	0.2704	3.6976	0.9653	52
9	0.2613	0.2708	3.6933	0.9652	51
10	0.2616	0.2711	3.6891	0.9652	50
11	0.2619	0.2714	3.6848	0.9651	49
12	0.2622	0.2717	3.6806	0.9650	48
13	0.2625	0.2720	3.6764	0.9649	47
14	0.2628	0.2723	3.6722	0.9649	46
15	0.2630	0.2726	3.6680	0.9648	45
16	0.2633	0.2729	3.6638	0.9647	44
17	0.2636	0.2733	3.6596	0.9646	43
18	0.2639	0.2736	3.6554	0.9646	42
19	0.2642	0.2739	3.6512	0.9645	41
20	0.2644	0.2742	3.6470	0.9644	40
21	0.2647	0.2745	3.6429	0.9643	39
22	0.2650	0.2748	3.6387	0.9642	38
23	0.2653	0.2751	3.6346	0.9642	37
24	0.2656	0.2754	3.6305	0.9641	36
25	0.2658	0.2758	3.6264	0.9640	35
26	0.2661	0.2761	3.6222	0.9639	34
27	0.2664	0.2764	3.6181	0.9639	33
28	0.2667	0.2767	3.6140	0.9638	32
29	0.2670	0.2770	3.6100	0.9637	31
30	0.2672	0.2773	3.6059	0.9636	30
31	0.2675	0.2776	3.6018	0.9636	29
32	0.2678	0.2780	3.5978	0.9635	28
33	0.2681	0.2783	3.5937	0.9634	27
34	0.2684	0.2786	3.5897	0.9633	26
35	0.2686	0.2789	3.5856	0.9632	25
36	0.2689	0.2792	3.5816	0.9632	24
37	0.2692	0.2795	3.5776	0.9631	23
38	0.2695	0.2798	3.5736	0.9630	22
39	0.2698	0.2801	3.5696	0.9629	21
40	0.2700	0.2805	3.5656	0.9628	20
41	0.2703	0.2808	3.5616	0.9628	19
42	0.2706	0.2811	3.5576	0.9627	18
43	0.2709	0.2814	3.5536	0.9626	17
44	0.2712	0.2817	3.5497	0.9625	16
45	0.2714	0.2820	3.5457	0.9625	15
46	0.2717	0.2823	3.5418	0.9624	14
47	0.2720	0.2827	3.5379	0.9623	13
48	0.2723	0.2830	3.5339	0.9622	12
49	0.2726	0.2833	3.5300	0.9621	11
50	0.2728	0.2836	3.5261	0.9621	10
51	0.2731	0.2839	3.5222	0.9620	9
52	0.2734	0.2842	3.5183	0.9619	8
53	0.2737	0.2845	3.5144	0.9618	7
54	0.2740	0.2849	3.5105	0.9617	6
55	0.2742	0.2852	3.5067	0.9617	5
56	0.2745	0.2855	3.5028	0.9616	4
57	0.2748	0.2858	3.4989	0.9615	3
58	0.2751	0.2861	3.4951	0.9614	2
59	0.2754	0.2864	3.4912	0.9613	1
60	0.2756	0.2867	3.4874	0.9613	0
	Cos	Cot	Tan	Sin	′

*165° 255° *345° **75°** NATURAL **74°** *164° 254° *344°

*106° 196° *286° **16°** NATURAL **17°** *107° 197° *287°

′	Sin	Tan	Cot	Cos	
0	0.2756	0.2867	3.4874	0.9613	60
1	0.2759	0.2871	3.4836	0.9612	59
2	0.2762	0.2874	3.4798	0.9611	58
3	0.2765	0.2877	3.4760	0.9610	57
4	0.2768	0.2880	3.4722	0.9609	56
5	0.2770	0.2883	3.4684	0.9609	55
6	0.2773	0.2886	3.4646	0.9608	54
7	0.2776	0.2890	3.4608	0.9607	53
8	0.2779	0.2893	3.4570	0.9606	52
9	0.2782	0.2896	3.4533	0.9605	51
10	0.2784	0.2899	3.4495	0.9605	50
11	0.2787	0.2902	3.4458	0.9604	49
12	0.2790	0.2905	3.4420	0.9603	48
13	0.2793	0.2908	3.4383	0.9602	47
14	0.2795	0.2912	3.4346	0.9601	46
15	0.2798	0.2915	3.4308	0.9600	45
16	0.2801	0.2918	3.4271	0.9600	44
17	0.2804	0.2921	3.4234	0.9599	43
18	0.2807	0.2924	3.4197	0.9598	42
19	0.2809	0.2927	3.4160	0.9597	41
20	0.2812	0.2931	3.4124	0.9596	40
21	0.2815	0.2934	3.4087	0.9596	39
22	0.2818	0.2937	3.4050	0.9595	38
23	0.2821	0.2940	3.4014	0.9594	37
24	0.2823	0.2943	3.3977	0.9593	36
25	0.2826	0.2946	3.3941	0.9592	35
26	0.2829	0.2949	3.3904	0.9591	34
27	0.2832	0.2953	3.3868	0.9591	33
28	0.2835	0.2956	3.3832	0.9590	32
29	0.2837	0.2959	3.3796	0.9589	31
30	0.2840	0.2962	3.3759	0.9588	30
31	0.2843	0.2965	3.3723	0.9587	29
32	0.2846	0.2968	3.3687	0.9587	28
33	0.2849	0.2972	3.3652	0.9586	27
34	0.2851	0.2975	3.3616	0.9585	26
35	0.2854	0.2978	3.3580	0.9584	25
36	0.2857	0.2981	3.3544	0.9583	24
37	0.2860	0.2984	3.3509	0.9582	23
38	0.2862	0.2987	3.3473	0.9582	22
39	0.2865	0.2991	3.3438	0.9581	21
40	0.2868	0.2994	3.3402	0.9580	20
41	0.2871	0.2997	3.3367	0.9579	19
42	0.2874	0.3000	3.3332	0.9578	18
43	0.2876	0.3003	3.3297	0.9577	17
44	0.2879	0.3006	3.3261	0.9577	16
45	0.2882	0.3010	3.3226	0.9576	15
46	0.2885	0.3013	3.3191	0.9575	14
47	0.2888	0.3016	3.3156	0.9574	13
48	0.2890	0.3019	3.3122	0.9573	12
49	0.2893	0.3022	3.3087	0.9572	11
50	0.2896	0.3026	3.3052	0.9572	10
51	0.2899	0.3029	3.3017	0.9571	9
52	0.2901	0.3032	3.2983	0.9570	8
53	0.2904	0.3035	3.2948	0.9569	7
54	0.2907	0.3038	3.2914	0.9568	6
55	0.2910	0.3041	3.2879	0.9567	5
56	0.2913	0.3045	3.2845	0.9566	4
57	0.2915	0.3048	3.2811	0.9566	3
58	0.2918	0.3051	3.2777	0.9565	2
59	0.2921	0.3054	3.2743	0.9564	1
60	0.2924	0.3057	3.2709	0.9563	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.2924	0.3057	3.2709	0.9563	60
1	0.2926	0.3060	3.2675	0.9562	59
2	0.2929	0.3064	3.2641	0.9561	58
3	0.2932	0.3067	3.2607	0.9560	57
4	0.2935	0.3070	3.2573	0.9560	56
5	0.2938	0.3073	3.2539	0.9559	55
6	0.2940	0.3076	3.2506	0.9558	54
7	0.2943	0.3080	3.2472	0.9557	53
8	0.2946	0.3083	3.2438	0.9556	52
9	0.2949	0.3086	3.2405	0.9555	51
10	0.2952	0.3089	3.2371	0.9555	50
11	0.2954	0.3092	3.2338	0.9554	49
12	0.2957	0.3096	3.2305	0.9553	48
13	0.2960	0.3099	3.2272	0.9552	47
14	0.2963	0.3102	3.2238	0.9551	46
15	0.2965	0.3105	3.2205	0.9550	45
16	0.2968	0.3108	3.2172	0.9549	44
17	0.2971	0.3111	3.2139	0.9548	43
18	0.2974	0.3115	3.2106	0.9548	42
19	0.2977	0.3118	3.2073	0.9547	41
20	0.2979	0.3121	3.2041	0.9546	40
21	0.2982	0.3124	3.2008	0.9545	39
22	0.2985	0.3127	3.1975	0.9544	38
23	0.2988	0.3131	3.1943	0.9543	37
24	0.2990	0.3134	3.1910	0.9542	36
25	0.2993	0.3137	3.1878	0.9542	35
26	0.2996	0.3140	3.1845	0.9541	34
27	0.2999	0.3143	3.1813	0.9540	33
28	0.3002	0.3147	3.1780	0.9539	32
29	0.3004	0.3150	3.1748	0.9538	31
30	0.3007	0.3153	3.1716	0.9537	30
31	0.3010	0.3156	3.1684	0.9536	29
32	0.3013	0.3159	3.1652	0.9535	28
33	0.3015	0.3163	3.1620	0.9535	27
34	0.3018	0.3166	3.1588	0.9534	26
35	0.3021	0.3169	3.1556	0.9533	25
36	0.3024	0.3172	3.1524	0.9532	24
37	0.3026	0.3175	3.1492	0.9531	23
38	0.3029	0.3179	3.1460	0.9530	22
39	0.3032	0.3182	3.1429	0.9529	21
40	0.3035	0.3185	3.1397	0.9528	20
41	0.3038	0.3188	3.1366	0.9527	19
42	0.3040	0.3191	3.1334	0.9527	18
43	0.3043	0.3195	3.1303	0.9526	17
44	0.3046	0.3198	3.1271	0.9525	16
45	0.3049	0.3201	3.1240	0.9524	15
46	0.3051	0.3204	3.1209	0.9523	14
47	0.3054	0.3207	3.1178	0.9522	13
48	0.3057	0.3211	3.1146	0.9521	12
49	0.3060	0.3214	3.1115	0.9520	11
50	0.3062	0.3217	3.1084	0.9520	10
51	0.3065	0.3220	3.1053	0.9519	9
52	0.3068	0.3223	3.1022	0.9518	8
53	0.3071	0.3227	3.0991	0.9517	7
54	0.3074	0.3230	3.0961	0.9516	6
55	0.3076	0.3233	3.0930	0.9515	5
56	0.3079	0.3236	3.0899	0.9514	4
57	0.3082	0.3240	3.0868	0.9513	3
58	0.3085	0.3243	3.0838	0.9512	2
59	0.3087	0.3246	3.0807	0.9511	1
60	0.3090	0.3249	3.0777	0.9511	0
	Cos	Cot	Tan	Sin	′

*163° 253° *343° **73°** NATURAL **72°** *162° 252° *342°

*108° 198° *288° **18°** NATURAL **19°** *109° 199° *289°

′	Sin	Tan	Cot	Cos	
0	0.3090	0.3249	3.0777	0.9511	60
1	0.3093	0.3252	3.0746	0.9510	59
2	0.3096	0.3256	3.0716	0.9509	58
3	0.3098	0.3259	3.0686	0.9508	57
4	0.3101	0.3262	3.0655	0.9507	56
5	0.3104	0.3265	3.0625	0.9506	55
6	0.3107	0.3269	3.0595	0.9505	54
7	0.3110	0.3272	3.0565	0.9504	53
8	0.3112	0.3275	3.0535	0.9503	52
9	0.3115	0.3278	3.0505	0.9502	51
10	0.3118	0.3281	3.0475	0.9502	50
11	0.3121	0.3285	3.0445	0.9501	49
12	0.3123	0.3288	3.0415	0.9500	48
13	0.3126	0.3291	3.0385	0.9499	47
14	0.3129	0.3294	3.0356	0.9498	46
15	0.3132	0.3298	3.0326	0.9497	45
16	0.3134	0.3301	3.0296	0.9496	44
17	0.3137	0.3304	3.0267	0.9495	43
18	0.3140	0.3307	3.0237	0.9494	42
19	0.3143	0.3310	3.0208	0.9493	41
20	0.3145	0.3314	3.0178	0.9492	40
21	0.3148	0.3317	3.0149	0.9492	39
22	0.3151	0.3320	3.0120	0.9491	38
23	0.3154	0.3323	3.0090	0.9490	37
24	0.3156	0.3327	3.0061	0.9489	36
25	0.3159	0.3330	3.0032	0.9488	35
26	0.3162	0.3333	3.0003	0.9487	34
27	0.3165	0.3336	2.9974	0.9486	33
28	0.3168	0.3339	2.9945	0.9485	32
29	0.3170	0.3343	2.9916	0.9484	31
30	0.3173	0.3346	2.9887	0.9483	30
31	0.3176	0.3349	2.9858	0.9482	29
32	0.3179	0.3352	2.9829	0.9481	28
33	0.3181	0.3356	2.9800	0.9480	27
34	0.3184	0.3359	2.9772	0.9480	26
35	0.3187	0.3362	2.9743	0.9479	25
36	0.3190	0.3365	2.9714	0.9478	24
37	0.3192	0.3369	2.9686	0.9477	23
38	0.3195	0.3372	2.9657	0.9476	22
39	0.3198	0.3375	2.9629	0.9475	21
40	0.3201	0.3378	2.9600	0.9474	20
41	0.3203	0.3382	2.9572	0.9473	19
42	0.3206	0.3385	2.9544	0.9472	18
43	0.3209	0.3388	2.9515	0.9471	17
44	0.3212	0.3391	2.9487	0.9470	16
45	0.3214	0.3395	2.9459	0.9469	15
46	0.3217	0.3398	2.9431	0.9468	14
47	0.3220	0.3401	2.9403	0.9467	13
48	0.3223	0.3404	2.9375	0.9466	12
49	0.3225	0.3408	2.9347	0.9466	11
50	0.3228	0.3411	2.9319	0.9465	10
51	0.3231	0.3414	2.9291	0.9464	9
52	0.3234	0.3417	2.9263	0.9463	8
53	0.3236	0.3421	2.9235	0.9462	7
54	0.3239	0.3424	2.9208	0.9461	6
55	0.3242	0.3427	2.9180	0.9460	5
56	0.3245	0.3430	2.9152	0.9459	4
57	0.3247	0.3434	2.9125	0.9458	3
58	0.3250	0.3437	2.9097	0.9457	2
59	0.3253	0.3440	2.9070	0.9456	1
60	0.3256	0.3443	2.9042	0.9455	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.3256	0.3443	2.9042	0.9455	60
1	0.3258	0.3447	2.9015	0.9454	59
2	0.3261	0.3450	2.8987	0.9453	58
3	0.3264	0.3453	2.8960	0.9452	57
4	0.3267	0.3456	2.8933	0.9451	56
5	0.3269	0.3460	2.8905	0.9450	55
6	0.3272	0.3463	2.8878	0.9449	54
7	0.3275	0.3466	2.8851	0.9449	53
8	0.3278	0.3469	2.8824	0.9448	52
9	0.3280	0.3473	2.8797	0.9447	51
10	0.3283	0.3476	2.8770	0.9446	50
11	0.3286	0.3479	2.8743	0.9445	49
12	0.3289	0.3482	2.8716	0.9444	48
13	0.3291	0.3486	2.8689	0.9443	47
14	0.3294	0.3489	2.8662	0.9442	46
15	0.3297	0.3492	2.8636	0.9441	45
16	0.3300	0.3495	2.8609	0.9440	44
17	0.3302	0.3499	2.8582	0.9439	43
18	0.3305	0.3502	2.8556	0.9438	42
19	0.3308	0.3505	2.8529	0.9437	41
20	0.3311	0.3508	2.8502	0.9436	40
21	0.3313	0.3512	2.8476	0.9435	39
22	0.3316	0.3515	2.8449	0.9434	38
23	0.3319	0.3518	2.8423	0.9433	37
24	0.3322	0.3522	2.8397	0.9432	36
25	0.3324	0.3525	2.8370	0.9431	35
26	0.3327	0.3528	2.8344	0.9430	34
27	0.3330	0.3531	2.8318	0.9429	33
28	0.3333	0.3535	2.8291	0.9428	32
29	0.3335	0.3538	2.8265	0.9427	31
30	0.3338	0.3541	2.8239	0.9426	30
31	0.3341	0.3544	2.8213	0.9425	29
32	0.3344	0.3548	2.8187	0.9424	28
33	0.3346	0.3551	2.8161	0.9423	27
34	0.3349	0.3554	2.8135	0.9423	26
35	0.3352	0.3558	2.8109	0.9422	25
36	0.3355	0.3561	2.8083	0.9421	24
37	0.3357	0.3564	2.8057	0.9420	23
38	0.3360	0.3567	2.8032	0.9419	22
39	0.3363	0.3571	2.8006	0.9418	21
40	0.3365	0.3574	2.7980	0.9417	20
41	0.3368	0.3577	2.7955	0.9416	19
42	0.3371	0.3581	2.7929	0.9415	18
43	0.3374	0.3584	2.7903	0.9414	17
44	0.3376	0.3587	2.7878	0.9413	16
45	0.3379	0.3590	2.7852	0.9412	15
46	0.3382	0.3594	2.7827	0.9411	14
47	0.3385	0.3597	2.7801	0.9410	13
48	0.3387	0.3600	2.7776	0.9409	12
49	0.3390	0.3604	2.7751	0.9408	11
50	0.3393	0.3607	2.7725	0.9407	10
51	0.3396	0.3610	2.7700	0.9406	9
52	0.3398	0.3613	2.7675	0.9405	8
53	0.3401	0.3617	2.7650	0.9404	7
54	0.3404	0.3620	2.7625	0.9403	6
55	0.3407	0.3623	2.7600	0.9402	5
56	0.3409	0.3627	2.7575	0.9401	4
57	0.3412	0.3630	2.7550	0.9400	3
58	0.3415	0.3633	2.7525	0.9399	2
59	0.3417	0.3636	2.7500	0.9398	1
60	0.3420	0.3640	2.7475	0.9397	0
	Cos	Cot	Tan	Sin	

*161° 251° *341° **71°** NATURAL **70°** *160° 250° *340°

*110° 200° *290° **20°** NATURAL **21°** *111° 201° *291°

	Sin	Tan	Cot	Cos	
0	0.3420	0.3640	2.7475	0.9397	60
1	0.3423	0.3643	2.7450	0.9396	59
2	0.3426	0.3646	2.7425	0.9395	58
3	0.3428	0.3650	2.7400	0.9394	57
4	0.3431	0.3653	2.7376	0.9393	56
5	0.3434	0.3656	2.7351	0.9392	55
6	0.3437	0.3659	2.7326	0.9391	54
7	0.3439	0.3663	2.7302	0.9390	53
8	0.3442	0.3666	2.7277	0.9389	52
9	0.3445	0.3669	2.7253	0.9388	51
10	0.3448	0.3673	2.7228	0.9387	50
11	0.3450	0.3676	2.7204	0.9386	49
12	0.3453	0.3679	2.7179	0.9385	48
13	0.3456	0.3683	2.7155	0.9384	47
14	0.3458	0.3686	2.7130	0.9383	46
15	0.3461	0.3689	2.7106	0.9382	45
16	0.3464	0.3693	2.7082	0.9381	44
17	0.3467	0.3696	2.7058	0.9380	43
18	0.3469	0.3699	2.7034	0.9379	42
19	0.3472	0.3702	2.7009	0.9378	41
20	0.3475	0.3706	2.6985	0.9377	40
21	0.3478	0.3709	2.6961	0.9376	39
22	0.3480	0.3712	2.6937	0.9375	38
23	0.3483	0.3716	2.6913	0.9374	37
24	0.3486	0.3719	2.6889	0.9373	36
25	0.3488	0.3722	2.6865	0.9372	35
26	0.3491	0.3726	2.6841	0.9371	34
27	0.3494	0.3729	2.6818	0.9370	33
28	0.3497	0.3732	2.6794	0.9369	32
29	0.3499	0.3736	2.6770	0.9368	31
30	0.3502	0.3739	2.6746	0.9367	30
31	0.3505	0.3742	2.6723	0.9366	29
32	0.3508	0.3745	2.6699	0.9365	28
33	0.3510	0.3749	2.6675	0.9364	27
34	0.3513	0.3752	2.6652	0.9363	26
35	0.3516	0.3755	2.6628	0.9362	25
36	0.3518	0.3759	2.6605	0.9361	24
37	0.3521	0.3762	2.6581	0.9360	23
38	0.3524	0.3765	2.6558	0.9359	22
39	0.3527	0.3769	2.6534	0.9358	21
40	0.3529	0.3772	2.6511	0.9356	20
41	0.3532	0.3775	2.6488	0.9355	19
42	0.3535	0.3779	2.6464	0.9354	18
43	0.3537	0.3782	2.6441	0.9353	17
44	0.3540	0.3785	2.6418	0.9352	16
45	0.3543	0.3789	2.6395	0.9351	15
46	0.3546	0.3792	2.6371	0.9350	14
47	0.3548	0.3795	2.6348	0.9349	13
48	0.3551	0.3799	2.6325	0.9348	12
49	0.3554	0.3802	2.6302	0.9347	11
50	0.3557	0.3805	2.6279	0.9346	10
51	0.3559	0.3809	2.6256	0.9345	9
52	0.3562	0.3812	2.6233	0.9344	8
53	0.3565	0.3815	2.6210	0.9343	7
54	0.3567	0.3819	2.6187	0.9342	6
55	0.3570	0.3822	2.6165	0.9341	5
56	0.3573	0.3825	2.6142	0.9340	4
57	0.3576	0.3829	2.6119	0.9339	3
58	0.3578	0.3832	2.6096	0.9338	2
59	0.3581	0.3835	2.6074	0.9337	1
60	0.3584	0.3839	2.6051	0.9336	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.3584	0.3839	2.6051	0.9336	60
1	0.3586	0.3842	2.6028	0.9335	59
2	0.3589	0.3845	2.6006	0.9334	58
3	0.3592	0.3849	2.5983	0.9333	57
4	0.3595	0.3852	2.5961	0.9332	56
5	0.3597	0.3855	2.5938	0.9331	55
6	0.3600	0.3859	2.5916	0.9330	54
7	0.3603	0.3862	2.5893	0.9328	53
8	0.3605	0.3865	2.5871	0.9327	52
9	0.3608	0.3869	2.5848	0.9326	51
10	0.3611	0.3872	2.5826	0.9325	50
11	0.3614	0.3875	2.5804	0.9324	49
12	0.3616	0.3879	2.5782	0.9323	48
13	0.3619	0.3882	2.5759	0.9322	47
14	0.3622	0.3885	2.5737	0.9321	46
15	0.3624	0.3889	2.5715	0.9320	45
16	0.3627	0.3892	2.5693	0.9319	44
17	0.3630	0.3895	2.5671	0.9318	43
18	0.3633	0.3899	2.5649	0.9317	42
19	0.3635	0.3902	2.5627	0.9316	41
20	0.3638	0.3906	2.5605	0.9315	40
21	0.3641	0.3909	2.5583	0.9314	39
22	0.3643	0.3912	2.5561	0.9313	38
23	0.3646	0.3916	2.5539	0.9312	37
24	0.3649	0.3919	2.5517	0.9311	36
25	0.3651	0.3922	2.5495	0.9309	35
26	0.3654	0.3926	2.5473	0.9308	34
27	0.3657	0.3929	2.5452	0.9307	33
28	0.3660	0.3932	2.5430	0.9306	32
29	0.3662	0.3936	2.5408	0.9305	31
30	0.3665	0.3939	2.5386	0.9304	30
31	0.3668	0.3942	2.5365	0.9303	29
32	0.3670	0.3946	2.5343	0.9302	28
33	0.3673	0.3949	2.5322	0.9301	27
34	0.3676	0.3953	2.5300	0.9300	26
35	0.3679	0.3956	2.5279	0.9299	25
36	0.3681	0.3959	2.5257	0.9298	24
37	0.3684	0.3963	2.5236	0.9297	23
38	0.3687	0.3966	2.5214	0.9296	22
39	0.3689	0.3969	2.5193	0.9295	21
40	0.3692	0.3973	2.5172	0.9293	20
41	0.3695	0.3976	2.5150	0.9292	19
42	0.3697	0.3979	2.5129	0.9291	18
43	0.3700	0.3983	2.5108	0.9290	17
44	0.3703	0.3986	2.5086	0.9289	16
45	0.3706	0.3990	2.5065	0.9288	15
46	0.3708	0.3993	2.5044	0.9287	14
47	0.3711	0.3996	2.5023	0.9286	13
48	0.3714	0.4000	2.5002	0.9285	12
49	0.3716	0.4003	2.4981	0.9284	11
50	0.3719	0.4006	2.4960	0.9283	10
51	0.3722	0.4010	2.4939	0.9282	9
52	0.3724	0.4013	2.4918	0.9281	8
53	0.3727	0.4017	2.4897	0.9279	7
54	0.3730	0.4020	2.4876	0.9278	6
55	0.3733	0.4023	2.4855	0.9277	5
56	0.3735	0.4027	2.4834	0.9276	4
57	0.3738	0.4030	2.4813	0.9275	3
58	0.3741	0.4033	2.4792	0.9274	2
59	0.3743	0.4037	2.4772	0.9273	1
60	0.3746	0.4040	2.4751	0.9272	0
	Cos	Cot	Tan	Sin	

*159° 249° *339° **69°** NATURAL **68°** *158° 248° *338°

*112° 202° *292° **22°** NATURAL **23°** *113° 203° *293°

′	Sin	Tan	Cot	Cos	
0	0.3746	0.4040	2.4751	0.9272	60
1	0.3749	0.4044	2.4730	0.9271	59
2	0.3751	0.4047	2.4709	0.9270	58
3	0.3754	0.4050	2.4689	0.9269	57
4	0.3757	0.4054	2.4668	0.9267	56
5	0.3760	0.4057	2.4648	0.9266	55
6	0.3762	0.4061	2.4627	0.9265	54
7	0.3765	0.4064	2.4606	0.9264	53
8	0.3768	0.4067	2.4586	0.9263	52
9	0.3770	0.4071	2.4566	0.9262	51
10	0.3773	0.4074	2.4545	0.9261	50
11	0.3776	0.4078	2.4525	0.9260	49
12	0.3778	0.4081	2.4504	0.9259	48
13	0.3781	0.4084	2.4484	0.9258	47
14	0.3784	0.4088	2.4464	0.9257	46
15	0.3786	0.4091	2.4443	0.9255	45
16	0.3789	0.4095	2.4423	0.9254	44
17	0.3792	0.4098	2.4403	0.9253	43
18	0.3795	0.4101	2.4383	0.9252	42
19	0.3797	0.4105	2.4362	0.9251	41
20	0.3800	0.4108	2.4342	0.9250	40
21	0.3803	0.4111	2.4322	0.9249	39
22	0.3805	0.4115	2.4302	0.9248	38
23	0.3808	0.4118	2.4282	0.9247	37
24	0.3811	0.4122	2.4262	0.9245	36
25	0.3813	0.4125	2.4242	0.9244	35
26	0.3816	0.4129	2.4222	0.9243	34
27	0.3819	0.4132	2.4202	0.9242	33
28	0.3821	0.4135	2.4182	0.9241	32
29	0.3824	0.4139	2.4162	0.9240	31
30	0.3827	0.4142	2.4142	0.9239	30
31	0.3830	0.4146	2.4122	0.9238	29
32	0.3832	0.4149	2.4102	0.9237	28
33	0.3835	0.4152	2.4083	0.9235	27
34	0.3838	0.4156	2.4063	0.9234	26
35	0.3840	0.4159	2.4043	0.9233	25
36	0.3843	0.4163	2.4023	0.9232	24
37	0.3846	0.4166	2.4004	0.9231	23
38	0.3848	0.4169	2.3984	0.9230	22
39	0.3851	0.4173	2.3964	0.9229	21
40	0.3854	0.4176	2.3945	0.9228	20
41	0.3856	0.4180	2.3925	0.9227	19
42	0.3859	0.4183	2.3906	0.9225	18
43	0.3862	0.4187	2.3886	0.9224	17
44	0.3864	0.4190	2.3867	0.9223	16
45	0.3867	0.4193	2.3847	0.9222	15
46	0.3870	0.4197	2.3828	0.9221	14
47	0.3872	0.4200	2.3808	0.9220	13
48	0.3875	0.4204	2.3789	0.9219	12
49	0.3878	0.4207	2.3770	0.9218	11
50	0.3881	0.4210	2.3750	0.9216	10
51	0.3883	0.4214	2.3731	0.9215	9
52	0.3886	0.4217	2.3712	0.9214	8
53	0.3889	0.4221	2.3693	0.9213	7
54	0.3891	0.4224	2.3673	0.9212	6
55	0.3894	0.4228	2.3654	0.9211	5
56	0.3897	0.4231	2.3635	0.9210	4
57	0.3899	0.4234	2.3616	0.9208	3
58	0.3902	0.4238	2.3597	0.9207	2
59	0.3905	0.4241	2.3578	0.9206	1
60	0.3907	0.4245	2.3559	0.9205	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.3907	0.4245	2.3559	0.9205	60
1	0.3910	0.4248	2.3539	0.9204	59
2	0.3913	0.4252	2.3520	0.9203	58
3	0.3915	0.4255	2.3501	0.9202	57
4	0.3918	0.4258	2.3483	0.9200	56
5	0.3921	0.4262	2.3464	0.9199	55
6	0.3923	0.4265	2.3445	0.9198	54
7	0.3926	0.4269	2.3426	0.9197	53
8	0.3929	0.4272	2.3407	0.9196	52
9	0.3931	0.4276	2.3388	0.9195	51
10	0.3934	0.4279	2.3369	0.9194	50
11	0.3937	0.4283	2.3351	0.9192	49
12	0.3939	0.4286	2.3332	0.9191	48
13	0.3942	0.4289	2.3313	0.9190	47
14	0.3945	0.4293	2.3294	0.9189	46
15	0.3947	0.4296	2.3276	0.9188	45
16	0.3950	0.4300	2.3257	0.9187	44
17	0.3953	0.4303	2.3238	0.9186	43
18	0.3955	0.4307	2.3220	0.9184	42
19	0.3958	0.4310	2.3201	0.9183	41
20	0.3961	0.4314	2.3183	0.9182	40
21	0.3963	0.4317	2.3164	0.9181	39
22	0.3966	0.4320	2.3146	0.9180	38
23	0.3969	0.4324	2.3127	0.9179	37
24	0.3971	0.4327	2.3109	0.9178	36
25	0.3974	0.4331	2.3090	0.9176	35
26	0.3977	0.4334	2.3072	0.9175	34
27	0.3979	0.4338	2.3053	0.9174	33
28	0.3982	0.4341	2.3035	0.9173	32
29	0.3985	0.4345	2.3017	0.9172	31
30	0.3987	0.4348	2.2998	0.9171	30
31	0.3990	0.4352	2.2980	0.9169	29
32	0.3993	0.4355	2.2962	0.9168	28
33	0.3995	0.4359	2.2944	0.9167	27
34	0.3998	0.4362	2.2925	0.9166	26
35	0.4001	0.4365	2.2907	0.9165	25
36	0.4003	0.4369	2.2889	0.9164	24
37	0.4006	0.4372	2.2871	0.9162	23
38	0.4009	0.4376	2.2853	0.9161	22
39	0.4011	0.4379	2.2835	0.9160	21
40	0.4014	0.4383	2.2817	0.9159	20
41	0.4017	0.4386	2.2799	0.9158	19
42	0.4019	0.4390	2.2781	0.9157	18
43	0.4022	0.4393	2.2763	0.9155	17
44	0.4025	0.4397	2.2745	0.9154	16
45	0.4027	0.4400	2.2727	0.9153	15
46	0.4030	0.4404	2.2709	0.9152	14
47	0.4033	0.4407	2.2691	0.9151	13
48	0.4035	0.4411	2.2673	0.9150	12
49	0.4038	0.4414	2.2655	0.9148	11
50	0.4041	0.4417	2.2637	0.9147	10
51	0.4043	0.4421	2.2620	0.9146	9
52	0.4046	0.4424	2.2602	0.9145	8
53	0.4049	0.4428	2.2584	0.9144	7
54	0.4051	0.4431	2.2566	0.9143	6
55	0.4054	0.4435	2.2549	0.9141	5
56	0.4057	0.4438	2.2531	0.9140	4
57	0.4059	0.4442	2.2513	0.9139	3
58	0.4062	0.4445	2.2496	0.9138	2
59	0.4065	0.4449	2.2478	0.9137	1
60	0.4067	0.4452	2.2460	0.9135	0
	Cos	Cot	Tan	Sin	′

*157° 247° *337° **67°** NATURAL **66°** *156° 246° *336°

*114° 204° *294° 24° NATURAL 25° *115° 205° *295°

′	Sin	Tan	Cot	Cos	
0	0.4067	0.4452	2.2460	0.9135	60
1	0.4070	0.4456	2.2443	0.9134	59
2	0.4073	0.4459	2.2425	0.9133	58
3	0.4075	0.4463	2.2408	0.9132	57
4	0.4078	0.4466	2.2390	0.9131	56
5	0.4081	0.4470	2.2373	0.9130	55
6	0.4083	0.4473	2.2355	0.9128	54
7	0.4086	0.4477	2.2338	0.9127	53
8	0.4089	0.4480	2.2320	0.9126	52
9	0.4091	0.4484	2.2303	0.9125	51
10	0.4094	0.4487	2.2286	0.9124	50
11	0.4097	0.4491	2.2268	0.9122	49
12	0.4099	0.4494	2.2251	0.9121	48
13	0.4102	0.4498	2.2234	0.9120	47
14	0.4105	0.4501	2.2216	0.9119	46
15	0.4107	0.4505	2.2199	0.9118	45
16	0.4110	0.4508	2.2182	0.9116	44
17	0.4112	0.4512	2.2165	0.9115	43
18	0.4115	0.4515	2.2148	0.9114	42
19	0.4118	0.4519	2.2130	0.9113	41
20	0.4120	0.4522	2.2113	0.9112	40
21	0.4123	0.4526	2.2096	0.9110	39
22	0.4126	0.4529	2.2079	0.9109	38
23	0.4128	0.4533	2.2062	0.9108	37
24	0.4131	0.4536	2.2045	0.9107	36
25	0.4134	0.4540	2.2028	0.9106	35
26	0.4136	0.4543	2.2011	0.9104	34
27	0.4139	0.4547	2.1994	0.9103	33
28	0.4142	0.4550	2.1977	0.9102	32
29	0.4144	0.4554	2.1960	0.9101	31
30	0.4147	0.4557	2.1943	0.9100	30
31	0.4150	0.4561	2.1926	0.9098	29
32	0.4152	0.4564	2.1909	0.9097	28
33	0.4155	0.4568	2.1892	0.9096	27
34	0.4158	0.4571	2.1876	0.9095	26
35	0.4160	0.4575	2.1859	0.9094	25
36	0.4163	0.4578	2.1842	0.9092	24
37	0.4165	0.4582	2.1825	0.9091	23
38	0.4168	0.4585	2.1808	0.9090	22
39	0.4171	0.4589	2.1792	0.9089	21
40	0.4173	0.4592	2.1775	0.9088	20
41	0.4176	0.4596	2.1758	0.9086	19
42	0.4179	0.4599	2.1742	0.9085	18
43	0.4181	0.4603	2.1725	0.9084	17
44	0.4184	0.4607	2.1708	0.9083	16
45	0.4187	0.4610	2.1692	0.9081	15
46	0.4189	0.4614	2.1675	0.9080	14
47	0.4192	0.4617	2.1659	0.9079	13
48	0.4195	0.4621	2.1642	0.9078	12
49	0.4197	0.4624	2.1625	0.9077	11
50	0.4200	0.4628	2.1609	0.9075	10
51	0.4202	0.4631	2.1592	0.9074	9
52	0.4205	0.4635	2.1576	0.9073	8
53	0.4208	0.4638	2.1560	0.9072	7
54	0.4210	0.4642	2.1543	0.9070	6
55	0.4213	0.4645	2.1527	0.9069	5
56	0.4216	0.4649	2.1510	0.9068	4
57	0.4218	0.4652	2.1494	0.9067	3
58	0.4221	0.4656	2.1478	0.9066	2
59	0.4224	0.4660	2.1461	0.9064	1
60	0.4226	0.4663	2.1445	0.9063	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.4226	0.4663	2.1445	0.9063	60
1	0.4229	0.4667	2.1429	0.9062	59
2	0.4231	0.4670	2.1413	0.9061	58
3	0.4234	0.4674	2.1396	0.9059	57
4	0.4237	0.4677	2.1380	0.9058	56
5	0.4239	0.4681	2.1364	0.9057	55
6	0.4242	0.4684	2.1348	0.9056	54
7	0.4245	0.4688	2.1332	0.9054	53
8	0.4247	0.4691	2.1315	0.9053	52
9	0.4250	0.4695	2.1299	0.9052	51
10	0.4253	0.4699	2.1283	0.9051	50
11	0.4255	0.4702	2.1267	0.9050	49
12	0.4258	0.4706	2.1251	0.9048	48
13	0.4260	0.4709	2.1235	0.9047	47
14	0.4263	0.4713	2.1219	0.9046	46
15	0.4266	0.4716	2.1203	0.9045	45
16	0.4268	0.4720	2.1187	0.9043	44
17	0.4271	0.4723	2.1171	0.9042	43
18	0.4274	0.4727	2.1155	0.9041	42
19	0.4276	0.4731	2.1139	0.9040	41
20	0.4279	0.4734	2.1123	0.9038	40
21	0.4281	0.4738	2.1107	0.9037	39
22	0.4284	0.4741	2.1092	0.9036	38
23	0.4287	0.4745	2.1076	0.9035	37
24	0.4289	0.4748	2.1060	0.9033	36
25	0.4292	0.4752	2.1044	0.9032	35
26	0.4295	0.4755	2.1028	0.9031	34
27	0.4297	0.4759	2.1013	0.9030	33
28	0.4300	0.4763	2.0997	0.9028	32
29	0.4302	0.4766	2.0981	0.9027	31
30	0.4305	0.4770	2.0965	0.9026	30
31	0.4308	0.4773	2.0950	0.9025	29
32	0.4310	0.4777	2.0934	0.9023	28
33	0.4313	0.4780	2.0918	0.9022	27
34	0.4316	0.4784	2.0903	0.9021	26
35	0.4318	0.4788	2.0887	0.9020	25
36	0.4321	0.4791	2.0872	0.9018	24
37	0.4323	0.4795	2.0856	0.9017	23
38	0.4326	0.4798	2.0840	0.9016	22
39	0.4329	0.4802	2.0825	0.9015	21
40	0.4331	0.4806	2.0809	0.9013	20
41	0.4334	0.4809	2.0794	0.9012	19
42	0.4337	0.4813	2.0778	0.9011	18
43	0.4339	0.4816	2.0763	0.9010	17
44	0.4342	0.4820	2.0748	0.9008	16
45	0.4344	0.4823	2.0732	0.9007	15
46	0.4347	0.4827	2.0717	0.9006	14
47	0.4350	0.4831	2.0701	0.9004	13
48	0.4352	0.4834	2.0686	0.9003	12
49	0.4355	0.4838	2.0671	0.9002	11
50	0.4358	0.4841	2.0655	0.9001	10
51	0.4360	0.4845	2.0640	0.8999	9
52	0.4363	0.4849	2.0625	0.8998	8
53	0.4365	0.4852	2.0609	0.8997	7
54	0.4368	0.4856	2.0594	0.8996	6
55	0.4371	0.4859	2.0579	0.8994	5
56	0.4373	0.4863	2.0564	0.8993	4
57	0.4376	0.4867	2.0549	0.8992	3
58	0.4378	0.4870	2.0533	0.8990	2
59	0.4381	0.4874	2.0518	0.8989	1
60	0.4384	0.4877	2.0503	0.8988	0
	Cos	Cot	Tan	Sin	′

*155° 245° *335° 65° NATURAL 64° *154° 244° *334°

*116° 206° *296° **26°** NATURAL **27°** *117° 207° *297°

′	Sin	Tan	Cot	Cos	
0	0.4384	0.4877	2.0503	0.8988	60
1	0.4386	0.4881	2.0488	0.8987	59
2	0.4389	0.4885	2.0473	0.8985	58
3	0.4392	0.4888	2.0458	0.8984	57
4	0.4394	0.4892	2.0443	0.8983	56
5	0.4397	0.4895	2.0428	0.8982	55
6	0.4399	0.4899	2.0413	0.8980	54
7	0.4402	0.4903	2.0398	0.8979	53
8	0.4405	0.4906	2.0383	0.8978	52
9	0.4407	0.4910	2.0368	0.8976	51
10	0.4410	0.4913	2.0353	0.8975	50
11	0.4412	0.4917	2.0338	0.8974	49
12	0.4415	0.4921	2.0323	0.8973	48
13	0.4418	0.4924	2.0308	0.8971	47
14	0.4420	0.4928	2.0293	0.8970	46
15	0.4423	0.4931	2.0278	0.8969	45
16	0.4425	0.4935	2.0263	0.8967	44
17	0.4428	0.4939	2.0248	0.8966	43
18	0.4431	0.4942	2.0233	0.8965	42
19	0.4433	0.4946	2.0219	0.8964	41
20	0.4436	0.4950	2.0204	0.8962	40
21	0.4439	0.4953	2.0189	0.8961	39
22	0.4441	0.4957	2.0174	0.8960	38
23	0.4444	0.4960	2.0160	0.8958	37
24	0.4446	0.4964	2.0145	0.8957	36
25	0.4449	0.4968	2.0130	0.8956	35
26	0.4452	0.4971	2.0115	0.8955	34
27	0.4454	0.4975	2.0101	0.8953	33
28	0.4457	0.4979	2.0086	0.8952	32
29	0.4459	0.4982	2.0072	0.8951	31
30	0.4462	0.4986	2.0057	0.8949	30
31	0.4465	0.4989	2.0042	0.8948	29
32	0.4467	0.4993	2.0028	0.8947	28
33	0.4470	0.4997	2.0013	0.8945	27
34	0.4472	0.5000	1.9999	0.8944	26
35	0.4475	0.5004	1.9984	0.8943	25
36	0.4478	0.5008	1.9970	0.8942	24
37	0.4480	0.5011	1.9955	0.8940	23
38	0.4483	0.5015	1.9941	0.8939	22
39	0.4485	0.5019	1.9926	0.8938	21
40	0.4488	0.5022	1.9912	0.8936	20
41	0.4491	0.5026	1.9897	0.8935	19
42	0.4493	0.5029	1.9883	0.8934	18
43	0.4496	0.5033	1.9868	0.8932	17
44	0.4498	0.5037	1.9854	0.8931	16
45	0.4501	0.5040	1.9840	0.8930	15
46	0.4504	0.5044	1.9825	0.8928	14
47	0.4506	0.5048	1.9811	0.8927	13
48	0.4509	0.5051	1.9797	0.8926	12
49	0.4511	0.5055	1.9782	0.8925	11
50	0.4514	0.5059	1.9768	0.8923	10
51	0.4517	0.5062	1.9754	0.8922	9
52	0.4519	0.5066	1.9740	0.8921	8
53	0.4522	0.5070	1.9725	0.8919	7
54	0.4524	0.5073	1.9711	0.8918	6
55	0.4527	0.5077	1.9697	0.8917	5
56	0.4530	0.5081	1.9683	0.8915	4
57	0.4532	0.5084	1.9669	0.8914	3
58	0.4535	0.5088	1.9654	0.8913	2
59	0.4537	0.5092	1.9640	0.8911	1
60	0.4540	0.5095	1.9626	0.8910	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.4540	0.5095	1.9626	0.8910	60
1	0.4542	0.5099	1.9612	0.8909	59
2	0.4545	0.5103	1.9598	0.8907	58
3	0.4548	0.5106	1.9584	0.8906	57
4	0.4550	0.5110	1.9570	0.8905	56
5	0.4553	0.5114	1.9556	0.8903	55
6	0.4555	0.5117	1.9542	0.8902	54
7	0.4558	0.5121	1.9528	0.8901	53
8	0.4561	0.5125	1.9514	0.8899	52
9	0.4563	0.5128	1.9500	0.8898	51
10	0.4566	0.5132	1.9486	0.8897	50
11	0.4568	0.5136	1.9472	0.8895	49
12	0.4571	0.5139	1.9458	0.8894	48
13	0.4574	0.5143	1.9444	0.8893	47
14	0.4576	0.5147	1.9430	0.8892	46
15	0.4579	0.5150	1.9416	0.8890	45
16	0.4581	0.5154	1.9402	0.8889	44
17	0.4584	0.5158	1.9388	0.8888	43
18	0.4586	0.5161	1.9375	0.8886	42
19	0.4589	0.5165	1.9361	0.8885	41
20	0.4592	0.5169	1.9347	0.8884	40
21	0.4594	0.5172	1.9333	0.8882	39
22	0.4597	0.5176	1.9319	0.8881	38
23	0.4599	0.5180	1.9306	0.8879	37
24	0.4602	0.5184	1.9292	0.8878	36
25	0.4605	0.5187	1.9278	0.8877	35
26	0.4607	0.5191	1.9265	0.8875	34
27	0.4610	0.5195	1.9251	0.8874	33
28	0.4612	0.5198	1.9237	0.8873	32
29	0.4615	0.5202	1.9223	0.8871	31
30	0.4617	0.5206	1.9210	0.8870	30
31	0.4620	0.5209	1.9196	0.8869	29
32	0.4623	0.5213	1.9183	0.8867	28
33	0.4625	0.5217	1.9169	0.8866	27
34	0.4628	0.5220	1.9155	0.8865	26
35	0.4630	0.5224	1.9142	0.8863	25
36	0.4633	0.5228	1.9128	0.8862	24
37	0.4636	0.5232	1.9115	0.8861	23
38	0.4638	0.5235	1.9101	0.8859	22
39	0.4641	0.5239	1.9088	0.8858	21
40	0.4643	0.5243	1.9074	0.8857	20
41	0.4646	0.5246	1.9061	0.8855	19
42	0.4648	0.5250	1.9047	0.8854	18
43	0.4651	0.5254	1.9034	0.8853	17
44	0.4654	0.5258	1.9020	0.8851	16
45	0.4656	0.5261	1.9007	0.8850	15
46	0.4659	0.5265	1.8993	0.8849	14
47	0.4661	0.5269	1.8980	0.8847	13
48	0.4664	0.5272	1.8967	0.8846	12
49	0.4666	0.5276	1.8953	0.8844	11
50	0.4669	0.5280	1.8940	0.8843	10
51	0.4672	0.5284	1.8927	0.8842	9
52	0.4674	0.5287	1.8913	0.8840	8
53	0.4677	0.5291	1.8900	0.8839	7
54	0.4679	0.5295	1.8887	0.8838	6
55	0.4682	0.5298	1.8873	0.8836	5
56	0.4684	0.5302	1.8860	0.8835	4
57	0.4687	0.5306	1.8847	0.8834	3
58	0.4690	0.5310	1.8834	0.8832	2
59	0.4692	0.5313	1.8820	0.8831	1
60	0.4695	0.5317	1.8807	0.8829	0
	Cos	Cot	Tan	Sin	

*153° 243° *333° **63°** NATURAL **62°** *152° 242° *332°

*118° 208° *298° 28° NATURAL 29° *119° 209° *299°

	Sin	Tan	Cot	Cos	
0	0.4695	0.5317	1.8807	0.8829	60
1	0.4697	0.5321	1.8794	0.8828	59
2	0.4700	0.5325	1.8781	0.8827	58
3	0.4702	0.5328	1.8768	0.8825	57
4	0.4705	0.5332	1.8755	0.8824	56
5	0.4708	0.5336	1.8741	0.8823	55
6	0.4710	0.5340	1.8728	0.8821	54
7	0.4713	0.5343	1.8715	0.8820	53
8	0.4715	0.5347	1.8702	0.8819	52
9	0.4718	0.5351	1.8689	0.8817	51
10	0.4720	0.5354	1.8676	0.8816	50
11	0.4723	0.5358	1.8663	0.8814	49
12	0.4726	0.5362	1.8650	0.8813	48
13	0.4728	0.5366	1.8637	0.8812	47
14	0.4731	0.5369	1.8624	0.8810	46
15	0.4733	0.5373	1.8611	0.8809	45
16	0.4736	0.5377	1.8598	0.8808	44
17	0.4738	0.5381	1.8585	0.8806	43
18	0.4741	0.5384	1.8572	0.8805	42
19	0.4743	0.5388	1.8559	0.8803	41
20	0.4746	0.5392	1.8546	0.8802	40
21	0.4749	0.5396	1.8533	0.8801	39
22	0.4751	0.5399	1.8520	0.8799	38
23	0.4754	0.5403	1.8507	0.8798	37
24	0.4756	0.5407	1.8495	0.8796	36
25	0.4759	0.5411	1.8482	0.8795	35
26	0.4761	0.5415	1.8469	0.8794	34
27	0.4764	0.5418	1.8456	0.8792	33
28	0.4766	0.5422	1.8443	0.8791	32
29	0.4769	0.5426	1.8430	0.8790	31
30	0.4772	0.5430	1.8418	0.8788	30
31	0.4774	0.5433	1.8405	0.8787	29
32	0.4777	0.5437	1.8392	0.8785	28
33	0.4779	0.5441	1.8379	0.8784	27
34	0.4782	0.5445	1.8367	0.8783	26
35	0.4784	0.5448	1.8354	0.8781	25
36	0.4787	0.5452	1.8341	0.8780	24
37	0.4789	0.5456	1.8329	0.8778	23
38	0.4792	0.5460	1.8316	0.8777	22
39	0.4795	0.5464	1.8303	0.8776	21
40	0.4797	0.5467	1.8291	0.8774	20
41	0.4800	0.5471	1.8278	0.8773	19
42	0.4802	0.5475	1.8265	0.8771	18
43	0.4805	0.5479	1.8253	0.8770	17
44	0.4807	0.5482	1.8240	0.8769	16
45	0.4810	0.5486	1.8228	0.8767	15
46	0.4812	0.5490	1.8215	0.8766	14
47	0.4815	0.5494	1.8202	0.8764	13
48	0.4818	0.5498	1.8190	0.8763	12
49	0.4820	0.5501	1.8177	0.8762	11
50	0.4823	0.5505	1.8165	0.8760	10
51	0.4825	0.5509	1.8152	0.8759	9
52	0.4828	0.5513	1.8140	0.8757	8
53	0.4830	0.5517	1.8127	0.8756	7
54	0.4833	0.5520	1.8115	0.8755	6
55	0.4835	0.5524	1.8103	0.8753	5
56	0.4838	0.5528	1.8090	0.8752	4
57	0.4840	0.5532	1.8078	0.8750	3
58	0.4843	0.5535	1.8065	0.8749	2
59	0.4846	0.5539	1.8053	0.8748	1
60	0.4848	0.5543	1.8040	0.8746	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.4848	0.5543	1.8040	0.8746	60
1	0.4851	0.5547	1.8028	0.8745	59
2	0.4853	0.5551	1.8016	0.8743	58
3	0.4856	0.5555	1.8003	0.8742	57
4	0.4858	0.5558	1.7991	0.8741	56
5	0.4861	0.5562	1.7979	0.8739	55
6	0.4863	0.5566	1.7966	0.8738	54
7	0.4866	0.5570	1.7954	0.8736	53
8	0.4868	0.5574	1.7942	0.8735	52
9	0.4871	0.5577	1.7930	0.8733	51
10	0.4874	0.5581	1.7917	0.8732	50
11	0.4876	0.5585	1.7905	0.8731	49
12	0.4879	0.5589	1.7893	0.8729	48
13	0.4881	0.5593	1.7881	0.8728	47
14	0.4884	0.5596	1.7868	0.8726	46
15	0.4886	0.5600	1.7856	0.8725	45
16	0.4889	0.5604	1.7844	0.8724	44
17	0.4891	0.5608	1.7832	0.8722	43
18	0.4894	0.5612	1.7820	0.8721	42
19	0.4896	0.5616	1.7808	0.8719	41
20	0.4899	0.5619	1.7796	0.8718	40
21	0.4901	0.5623	1.7783	0.8716	39
22	0.4904	0.5627	1.7771	0.8715	38
23	0.4907	0.5631	1.7759	0.8714	37
24	0.4909	0.5635	1.7747	0.8712	36
25	0.4912	0.5639	1.7735	0.8711	35
26	0.4914	0.5642	1.7723	0.8709	34
27	0.4917	0.5646	1.7711	0.8708	33
28	0.4919	0.5650	1.7699	0.8706	32
29	0.4922	0.5654	1.7687	0.8705	31
30	0.4924	0.5658	1.7675	0.8704	30
31	0.4927	0.5662	1.7663	0.8702	29
32	0.4929	0.5665	1.7651	0.8701	28
33	0.4932	0.5669	1.7639	0.8699	27
34	0.4934	0.5673	1.7627	0.8698	26
35	0.4937	0.5677	1.7615	0.8696	25
36	0.4939	0.5681	1.7603	0.8695	24
37	0.4942	0.5685	1.7591	0.8694	23
38	0.4944	0.5688	1.7579	0.8692	22
39	0.4947	0.5692	1.7567	0.8691	21
40	0.4950	0.5696	1.7556	0.8689	20
41	0.4952	0.5700	1.7544	0.8688	19
42	0.4955	0.5704	1.7532	0.8686	18
43	0.4957	0.5708	1.7520	0.8685	17
44	0.4960	0.5712	1.7508	0.8683	16
45	0.4962	0.5715	1.7496	0.8682	15
46	0.4965	0.5719	1.7485	0.8681	14
47	0.4967	0.5723	1.7473	0.8679	13
48	0.4970	0.5727	1.7461	0.8678	12
49	0.4972	0.5731	1.7449	0.8676	11
50	0.4975	0.5735	1.7437	0.8675	10
51	0.4977	0.5739	1.7426	0.8673	9
52	0.4980	0.5743	1.7414	0.8672	8
53	0.4982	0.5746	1.7402	0.8670	7
54	0.4985	0.5750	1.7391	0.8669	6
55	0.4987	0.5754	1.7379	0.8668	5
56	0.4990	0.5758	1.7367	0.8666	4
57	0.4992	0.5762	1.7355	0.8665	3
58	0.4995	0.5766	1.7344	0.8663	2
59	0.4997	0.5770	1.7332	0.8662	1
60	0.5000	0.5774	1.7321	0.8660	0
	Cos	Cot	Tan	Sin	′

*151° 241° *331° 61° NATURAL 60° *150° 240° *330°

*120° 210° *300° **30°** NATURAL **31°** *121° 211° *301°

′	Sin	Tan	Cot	Cos	
0	0.5000	0.5774	1.7321	0.8660	60
1	0.5003	0.5777	1.7309	0.8659	59
2	0.5005	0.5781	1.7297	0.8657	58
3	0.5008	0.5785	1.7286	0.8656	57
4	0.5010	0.5789	1.7274	0.8654	56
5	0.5013	0.5793	1.7262	0.8653	55
6	0.5015	0.5797	1.7251	0.8652	54
7	0.5018	0.5801	1.7239	0.8650	53
8	0.5020	0.580$\frac{5}{}$	1.7228	0.8649	52
9	0.5023	0.5808	1.7216	0.8647	51
10	0.5025	0.5812	1.720$\frac{5}{}$	0.8646	50
11	0.5028	0.5816	1.7193	0.8644	49
12	0.5030	0.5820	1.7182	0.8643	48
13	0.5033	0.5824	1.7170	0.8641	47
14	0.5035	0.5828	1.7159	0.8640	46
15	0.5038	0.5832	1.7147	0.8638	45
16	0.5040	0.5836	1.7136	0.8637	44
17	0.5043	0.5840	1.7124	0.8635	43
18	0.5045	0.5844	1.7113	0.8634	42
19	0.5048	0.5847	1.7102	0.8632	41
20	0.5050	0.585$\frac{1}{}$	1.7090	0.8631	40
21	0.5053	0.5855	1.7079	0.8630	39
22	0.5055	0.5859	1.7067	0.8628	38
23	0.5058	0.5863	1.7056	0.8627	37
24	0.5060	0.5867	1.704$\frac{5}{}$	0.8625	36
25	0.5063	0.5871	1.7033	0.8624	35
26	0.5065	0.587$\frac{5}{}$	1.7022	0.8622	34
27	0.5068	0.5879	1.7011	0.8621	33
28	0.5070	0.5883	1.6999	0.8619	32
29	0.5073	0.5887	1.6988	0.8618	31
30	0.5075	0.5890	1.6977	0.8616	30
31	0.5078	0.5894	1.6965	0.861$\frac{5}{}$	29
32	0.5080	0.5898	1.6954	0.8613	28
33	0.5083	0.5902	1.6943	0.8612	27
34	0.5085	0.5906	1.6932	0.8610	26
35	0.5088	0.5910	1.6920	0.8609	25
36	0.5090	0.5914	1.6909	0.8607	24
37	0.5093	0.5918	1.6898	0.8606	23
38	0.5095	0.5922	1.6887	0.8604	22
39	0.5098	0.5926	1.6875	0.8603	21
40	0.5100	0.5930	1.6864	0.8601	20
41	0.5103	0.5934	1.6853	0.8600	19
42	0.5105	0.5938	1.6842	0.8599	18
43	0.5108	0.5942	1.6831	0.8597	17
44	0.5110	0.5945	1.6820	0.8596	16
45	0.5113	0.5949	1.6808	0.8594	15
46	0.5115	0.5953	1.6797	0.8593	14
47	0.5118	0.5957	1.6786	0.8591	13
48	0.5120	0.5961	1.6775	0.8590	12
49	0.5123	0.5965	1.6764	0.8588	11
50	0.5125	0.5969	1.6753	0.8587	10
51	0.5128	0.5973	1.6742	0.8585	9
52	0.5130	0.5977	1.6731	0.8584	8
53	0.5133	0.5981	1.6720	0.8582	7
54	0.5135	0.598$\frac{5}{}$	1.6709	0.8581	6
55	0.5138	0.5989	1.6698	0.8579	5
56	0.5140	0.5993	1.6687	0.8578	4
57	0.5143	0.5997	1.6676	0.8576	3
58	0.5145	0.6001	1.666$\frac{5}{}$	0.857$\frac{5}{}$	2
59	0.5148	0.600$\frac{5}{}$	1.6654	0.8573	1
60	0.5150	0.6009	1.6643	0.8572	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.5150	0.6009	1.6643	0.8572	60
1	0.5153	0.6013	1.6632	0.8570	59
2	0.5155	0.6017	1.6621	0.8569	58
3	0.5158	0.6020	1.6610	0.8567	57
4	0.5160	0.6024	1.6599	0.8566	56
5	0.5163	0.6028	1.6588	0.8564	55
6	0.5165	0.6032	1.6577	0.8563	54
7	0.5168	0.6036	1.6566	0.8561	53
8	0.5170	0.6040	1.6555	0.8560	52
9	0.5173	0.6044	1.654$\frac{5}{}$	0.8558	51
10	0.5175	0.6048	1.6534	0.8557	50
11	0.5178	0.6052	1.6523	0.8555	49
12	0.5180	0.6056	1.6512	0.8554	48
13	0.5183	0.6060	1.6501	0.8552	47
14	0.5185	0.6064	1.6490	0.8551	46
15	0.5188	0.6068	1.6479	0.8549	45
16	0.5190	0.6072	1.6469	0.8548	44
17	0.5193	0.6076	1.6458	0.8546	43
18	0.5195	0.6080	1.6447	0.854$\frac{5}{}$	42
19	0.5198	0.6084	1.6436	0.8543	41
20	0.5200	0.6088	1.6426	0.8542	40
21	0.5203	0.6092	1.641$\frac{5}{}$	0.8540	39
22	0.5205	0.6096	1.6404	0.8539	38
23	0.5208	0.6100	1.6393	0.8537	37
24	0.5210	0.6104	1.6383	0.8536	36
25	0.5213	0.6108	1.6372	0.8534	35
26	0.5215	0.6112	1.6361	0.8532	34
27	0.5218	0.6116	1.6351	0.8531	33
28	0.5220	0.6120	1.6340	0.8529	32
29	0.5223	0.6124	1.6329	0.8528	31
30	0.522$\frac{5}{}$	0.6128	1.6319	0.8526	30
31	0.5227	0.6132	1.6308	0.852$\frac{5}{}$	29
32	0.5230	0.6136	1.6297	0.8523	28
33	0.5232	0.6140	1.6287	0.8522	27
34	0.523$\frac{5}{}$	0.6144	1.6276	0.8520	26
35	0.5237	0.6148	1.6265	0.8519	25
36	0.5240	0.6152	1.625$\frac{5}{}$	0.8517	24
37	0.5242	0.6156	1.6244	0.8516	23
38	0.524$\frac{5}{}$	0.6160	1.6234	0.8514	22
39	0.5247	0.6164	1.6223	0.8513	21
40	0.525$\frac{0}{}$	0.6168	1.6212	0.8511	20
41	0.5252	0.6172	1.6202	0.8510	19
42	0.525$\frac{5}{}$	0.6176	1.6191	0.8508	18
43	0.5257	0.6180	1.6181	0.8507	17
44	0.5260	0.6184	1.6170	0.8505	16
45	0.5262	0.6188	1.6160	0.8504	15
46	0.526$\frac{5}{}$	0.6192	1.6149	0.8502	14
47	0.5267	0.6196	1.6139	0.8500	13
48	0.5270	0.6200	1.6128	0.8499	12
49	0.5272	0.6204	1.6118	0.8497	11
50	0.527$\frac{5}{}$	0.6208	1.6107	0.8496	10
51	0.5277	0.6212	1.6097	0.8494	9
52	0.5279	0.6216	1.6087	0.8493	8
53	0.5282	0.6220	1.6076	0.8491	7
54	0.5284	0.6224	1.6066	0.8490	6
55	0.5287	0.6228	1.6055	0.8488	5
56	0.5289	0.6233	1.604$\frac{5}{}$	0.8487	4
57	0.5292	0.6237	1.6034	0.8485	3
58	0.5294	0.6241	1.6024	0.8484	2
59	0.5297	0.624$\frac{5}{}$	1.6014	0.8482	1
60	0.5299	0.6249	1.6003	0.8480	0
	Cos	Cot	Tan	Sin	

*149° 239° *329° **59°** NATURAL **58°** *148° 238° *328°

*122° 212° *302° **32°** NATURAL **33°** *123° 213° *303°

	Sin	Tan	Cot	Cos	
0	0.5299	0.6249	1.6003	0.8480	60
1	0.5302	0.6253	1.5993	0.8479	59
2	0.5304	0.6257	1.5983	0.8477	58
3	0.5307	0.6261	1.5972	0.8476	57
4	0.5309	0.6265	1.5962	0.8474	56
5	0.5312	0.6269	1.5952	0.8473	55
6	0.5314	0.6273	1.5941	0.8471	54
7	0.5316	0.6277	1.5931	0.8470	53
8	0.5319	0.6281	1.5921	0.8468	52
9	0.5321	0.6285	1.5911	0.8467	51
10	0.5324	0.6289	1.5900	0.8465	50
11	0.5326	0.6293	1.5890	0.8463	49
12	0.5329	0.6297	1.5880	0.8462	48
13	0.5331	0.6301	1.5869	0.8460	47
14	0.5334	0.6305	1.5859	0.8459	46
15	0.5336	0.6310	1.5849	0.8457	45
16	0.5339	0.6314	1.5839	0.8456	44
17	0.5341	0.6318	1.5829	0.8454	43
18	0.5344	0.6322	1.5818	0.8453	42
19	0.5346	0.6326	1.5808	0.8451	41
20	0.5348	0.6330	1.5798	0.8450	40
21	0.5351	0.6334	1.5788	0.8448	39
22	0.5353	0.6338	1.5778	0.8446	38
23	0.5356	0.6342	1.5768	0.8445	37
24	0.5358	0.6346	1.5757	0.8443	36
25	0.5361	0.6350	1.5747	0.8442	35
26	0.5363	0.6354	1.5737	0.8440	34
27	0.5366	0.6358	1.5727	0.8439	33
28	0.5368	0.6363	1.5717	0.8437	32
29	0.5371	0.6367	1.5707	0.8435	31
30	0.5373	0.6371	1.5697	0.8434	30
31	0.5375	0.6375	1.5687	0.8432	29
32	0.5378	0.6379	1.5677	0.8431	28
33	0.5380	0.6383	1.5667	0.8429	27
34	0.5383	0.6387	1.5657	0.8428	26
35	0.5385	0.6391	1.5647	0.8426	25
36	0.5388	0.6395	1.5637	0.8425	24
37	0.5390	0.6399	1.5627	0.8423	23
38	0.5393	0.6403	1.5617	0.8421	22
39	0.5395	0.6408	1.5607	0.8420	21
40	0.5398	0.6412	1.5597	0.8418	20
41	0.5400	0.6416	1.5587	0.8417	19
42	0.5402	0.6420	1.5577	0.8415	18
43	0.5405	0.6424	1.5567	0.8414	17
44	0.5407	0.6428	1.5557	0.8412	16
45	0.5410	0.6432	1.5547	0.8410	15
46	0.5412	0.6436	1.5537	0.8409	14
47	0.5415	0.6440	1.5527	0.8407	13
48	0.5417	0.6445	1.5517	0.8406	12
49	0.5420	0.6449	1.5507	0.8404	11
50	0.5422	0.6453	1.5497	0.8403	10
51	0.5424	0.6457	1.5487	0.8401	9
52	0.5427	0.6461	1.5477	0.8399	8
53	0.5429	0.6465	1.5468	0.8398	7
54	0.5432	0.6469	1.5458	0.8396	6
55	0.5434	0.6473	1.5448	0.8395	5
56	0.5437	0.6478	1.5438	0.8393	4
57	0.5439	0.6482	1.5428	0.8391	3
58	0.5442	0.6486	1.5418	0.8390	2
59	0.5444	0.6490	1.5408	0.8388	1
60	0.5446	0.6494	1.5399	0.8387	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.5446	0.6494	1.5399	0.8387	60
1	0.5449	0.6498	1.5389	0.8385	59
2	0.5451	0.6502	1.5379	0.8384	58
3	0.5454	0.6506	1.5369	0.8382	57
4	0.5456	0.6511	1.5359	0.8380	56
5	0.5459	0.6515	1.5350	0.8379	55
6	0.5461	0.6519	1.5340	0.8377	54
7	0.5463	0.6523	1.5330	0.8376	53
8	0.5466	0.6527	1.5320	0.8374	52
9	0.5468	0.6531	1.5311	0.8372	51
10	0.5471	0.6536	1.5301	0.8371	50
11	0.5473	0.6540	1.5291	0.8369	49
12	0.5476	0.6544	1.5282	0.8368	48
13	0.5478	0.6548	1.5272	0.8366	47
14	0.5480	0.6552	1.5262	0.8364	46
15	0.5483	0.6556	1.5253	0.8363	45
16	0.5485	0.6560	1.5243	0.8361	44
17	0.5488	0.6565	1.5233	0.8360	43
18	0.5490	0.6569	1.5224	0.8358	42
19	0.5493	0.6573	1.5214	0.8356	41
20	0.5495	0.6577	1 5204	0.8355	40
21	0.5498	0.6581	1.5195	0.8353	39
22	0.5500	0.6585	1.5185	0.8352	38
23	0.5502	0.6590	1.5175	0.8350	37
24	0.5505	0.6594	1.5166	0.8348	36
25	0.5507	0.6598	1.5156	0.8347	35
26	0.5510	0.6602	1.5147	0.8345	34
27	0.5512	0.6606	1.5137	0.8344	33
28	0.5515	0.6610	1.5127	0.8342	32
29	0.5517	0.6615	1.5118	0.8340	31
30	0.5519	0.6619	1.5108	0.8339	30
31	0.5522	0.6623	1.5099	0.8337	29
32	0.5524	0.6627	1.5089	0.8336	28
33	0.5527	0.6631	1.5080	0.8334	27
34	0.5529	0.6636	1.5070	0.8332	26
35	0.5531	0.6640	1.5061	0.8331	25
36	0.5534	0.6644	1.5051	0.8329	24
37	0.5536	0.6648	1.5042	0.8328	23
38	0.5539	0.6652	1.5032	0.8326	22
39	0.5541	0.6657	1.5023	0.8324	21
40	0.5544	0.6661	1.5013	0.8323	20
41	0.5546	0.6665	1.5004	0.8321	19
42	0.5548	0.6669	1.4994	0.8320	18
43	0.5551	0.6673	1.4985	0.8318	17
44	0.5553	0.6678	1.4975	0.8316	16
45	0.5556	0.6682	1.4966	0.8315	15
46	0.5558	0.6686	1.4957	0.8313	14
47	0.5561	0.6690	1.4947	0.8311	13
48	0.5563	0.6694	1.4938	0.8310	12
49	0.5565	0.6699	1.4928	0.8308	11
50	0.5568	0.6703	1.4919	0.8307	10
51	0.5570	0.6707	1.4910	0.8305	9
52	0.5573	0.6711	1.4900	0.8303	8
53	0.5575	0.6715	1.4891	0.8302	7
54	0.5577	0.6720	1.4882	0.8300	6
55	0.5580	0.6724	1.4872	0.8298	5
56	0.5582	0.6728	1.4863	0.8297	4
57	0.5585	0.6732	1.4854	0.8295	3
58	0.5587	0.6737	1.4844	0.8294	2
59	0.5590	0.6741	1.4835	0.8292	1
60	0.5592	0.6745	1.4826	0.8290	0
	Cos	Cot	Tan	Sin	′

*147° 237° *327° **57°** NATURAL **56°** *146° 236° *326°

*124° 214° *304° **34°** NATURAL **35°** *125° 215° *305°

′	Sin	Tan	Cot	Cos	
0	0.5592	0.6745	1.4826	0.8290	60
1	0.5594	0.6749	1.4816	0.8289	59
2	0.5597	0.6754	1.4807	0.8287	58
3	0.5599	0.6758	1.4798	0.8285	57
4	0.5602	0.6762	1.4788	0.8284	56
5	0.5604	0.6766	1.4779	0.8282	55
6	0.5606	0.6771	1.4770	0.8281	54
7	0.5609	0.6775	1.4761	0.8279	53
8	0.5611	0.6779	1.4751	0.8277	52
9	0.5614	0.6783	1.4742	0.8276	51
10	0.5616	0.6787	1.4733	0.8274	50
11	0.5618	0.6792	1.4724	0.8272	49
12	0.5621	0.6796	1.4715	0.8271	48
13	0.5623	0.6800	1.4705	0.8269	47
14	0.5626	0.6805	1.4696	0.8268	46
15	0.5628	0.6809	1.4687	0.8266	45
16	0.5630	0.6813	1.4678	0.8264	44
17	0.5633	0.6817	1.4669	0.8263	43
18	0.5635	0.6822	1.4659	0.8261	42
19	0.5638	0.6826	1.4650	0.8259	41
20	0.5640	0.6830	1.4641	0.8258	40
21	0.5642	0.6834	1.4632	0.8256	39
22	0.5645	0.6839	1.4623	0.8254	38
23	0.5647	0.6843	1.4614	0.8253	37
24	0.5650	0.6847	1.4605	0.8251	36
25	0.5652	0.6851	1.4596	0.8249	35
26	0.5654	0.6856	1.4586	0.8248	34
27	0.5657	0.6860	1.4577	0.8246	33
28	0.5659	0.6864	1.4568	0.8245	32
29	0.5662	0.6869	1.4559	0.8243	31
30	0.5664	0.6873	1.4550	0.8241	30
31	0.5666	0.6877	1.4541	0.8240	29
32	0.5669	0.6881	1.4532	0.8238	28
33	0.5671	0.6886	1.4523	0.8236	27
34	0.5674	0.6890	1.4514	0.8235	26
35	0.5676	0.6894	1.4505	0.8233	25
36	0.5678	0.6899	1.4496	0.8231	24
37	0.5681	0.6903	1.4487	0.8230	23
38	0.5683	0.6907	1.4478	0.8228	22
39	0.5686	0.6911	1.4469	0.8226	21
40	0.5688	0.6916	1.4460	0.8225	20
41	0.5690	0.6920	1.4451	0.8223	19
42	0.5693	0.6924	1.4442	0.8221	18
43	0.5695	0.6929	1.4433	0.8220	17
44	0.5698	0.6933	1.4424	0.8218	16
45	0.5700	0.6937	1.4415	0.8216	15
46	0.5702	0.6942	1.4406	0.8215	14
47	0.5705	0.6946	1.4397	0.8213	13
48	0.5707	0.6950	1.4388	0.8211	12
49	0.5710	0.6954	1.4379	0.8210	11
50	0.5712	0.6959	1.4370	0.8208	10
51	0.5714	0.6963	1.4361	0.8207	9
52	0.5717	0.6967	1.4352	0.8205	8
53	0.5719	0.6972	1.4344	0.8203	7
54	0.5721	0.6976	1.4335	0.8202	6
55	0.5724	0.6980	1.4326	0.8200	5
56	0.5726	0.6985	1.4317	0.8198	4
57	0.5729	0.6989	1.4308	0.8197	3
58	0.5731	0.6993	1.4299	0.8195	2
59	0.5733	0.6998	1.4290	0.8193	1
60	0.5736	0.7002	1.4281	0.8192	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.5736	0.7002	1.4281	0.8192	60
1	0.5738	0.7006	1.4273	0.8190	59
2	0.5741	0.7011	1.4264	0.8188	58
3	0.5743	0.7015	1.4255	0.8187	57
4	0.5745	0.7019	1.4246	0.8185	56
5	0.5748	0.7024	1.4237	0.8183	55
6	0.5750	0.7028	1.4229	0.8181	54
7	0.5752	0.7032	1.4220	0.8180	53
8	0.5755	0.7037	1.4211	0.8178	52
9	0.5757	0.7041	1.4202	0.8176	51
10	0.5760	0.7046	1.4193	0.8175	50
11	0.5762	0.7050	1.4185	0.8173	49
12	0.5764	0.7054	1.4176	0.8171	48
13	0.5767	0.7059	1.4167	0.8170	47
14	0.5769	0.7063	1.4158	0.8168	46
15	0.5771	0.7067	1.4150	0.8166	45
16	0.5774	0.7072	1.4141	0.8165	44
17	0.5776	0.7076	1.4132	0.8163	43
18	0.5779	0.7080	1.4124	0.8161	42
19	0.5781	0.7085	1.4115	0.8160	41
20	0.5783	0.7089	1.4106	0.8158	40
21	0.5786	0.7094	1.4097	0.8156	39
22	0.5788	0.7098	1.4089	0.8155	38
23	0.5790	0.7102	1.4080	0.8153	37
24	0.5793	0.7107	1.4071	0.8151	36
25	0.5795	0.7111	1.4063	0.8150	35
26	0.5798	0.7115	1.4054	0.8148	34
27	0.5800	0.7120	1.4045	0.8146	33
28	0.5802	0.7124	1.4037	0.8145	32
29	0.5805	0.7129	1.4028	0.8143	31
30	0.5807	0.7133	1.4019	0.8141	30
31	0.5809	0.7137	1.4011	0.8139	29
32	0.5812	0.7142	1.4002	0.8138	28
33	0.5814	0.7146	1.3994	0.8136	27
34	0.5816	0.7151	1.3985	0.8134	26
35	0.5819	0.7155	1.3976	0.8133	25
36	0.5821	0.7159	1.3968	0.8131	24
37	0.5824	0.7164	1.3959	0.8129	23
38	0.5826	0.7168	1.3951	0.8128	22
39	0.5828	0.7173	1.3942	0.8126	21
40	0.5831	0.7177	1.3934	0.8124	20
41	0.5833	0.7181	1.3925	0.8123	19
42	0.5835	0.7186	1.3916	0.8121	18
43	0.5838	0.7190	1.3908	0.8119	17
44	0.5840	0.7195	1.3899	0.8117	16
45	0.5842	0.7199	1.3891	0.8116	15
46	0.5845	0.7203	1.3882	0.8114	14
47	0.5847	0.7208	1.3874	0.8112	13
48	0.5850	0.7212	1.3865	0.8111	12
49	0.5852	0.7217	1.3857	0.8109	11
50	0.5854	0.7221	1.3848	0.8107	10
51	0.5857	0.7226	1.3840	0.8106	9
52	0.5859	0.7230	1.3831	0.8104	8
53	0.5861	0.7234	1.3823	0.8102	7
54	0.5864	0.7239	1.3814	0.8100	6
55	0.5866	0.7243	1.3806	0.8099	5
56	0.5868	0.7248	1.3798	0.8097	4
57	0.5871	0.7252	1.3789	0.8095	3
58	0.5873	0.7257	1.3781	0.8094	2
59	0.5875	0.7261	1.3772	0.8092	1
60	0.5878	0.7265	1.3764	0.8090	0
	Cos	Cot	Tan	Sin	′

*145° 235° *325° **55°** NATURAL **54°** *144° 234° *324°

*126° 216° *306° **36°** NATURAL **37°** *127° 217° *307°

	Sin	Tan	Cot	Cos	
0	0.5878	0.7265	1.3764	0.8090	60
1	0.5880	0.7270	1.3755	0.8088	59
2	0.5883	0.7274	1.3747	0.8087	58
3	0.5885	0.7279	1.3739	0.8085	57
4	0.5887	0.7283	1.3730	0.8083	56
5	0.5890	0.7288	1.3722	0.8082	55
6	0.5892	0.7292	1.3713	0.8080	54
7	0.5894	0.7297	1.3705	0.8078	53
8	0.5897	0.7301	1.3697	0.8076	52
9	0.5899	0.7306	1.3688	0.8075	51
10	0.5901	0.7310	1.3680	0.8073	50
11	0.5904	0.7314	1.3672	0.8071	49
12	0.5906	0.7319	1.3663	0.8070	48
13	0.5908	0.7323	1.3655	0.8068	47
14	0.5911	0.7328	1.3647	0.8066	46
15	0.5913	0.7332	1.3638	0.8064	45
16	0.5915	0.7337	1.3630	0.8063	44
17	0.5918	0.7341	1.3622	0.8061	43
18	0.5920	0.7346	1.3613	0.8059	42
19	0.5922	0.7350	1.3605	0.8058	41
20	0.5925	0.7355	1.3597	0.8056	40
21	0.5927	0.7359	1.3588	0.8054	39
22	0.5930	0.7364	1.3580	0.8052	38
23	0.5932	0.7368	1.3572	0.8051	37
24	0.5934	0.7373	1.3564	0.8049	36
25	0.5937	0.7377	1.3555	0.8047	35
26	0.5939	0.7382	1.3547	0.8045	34
27	0.5941	0.7386	1.3539	0.8044	33
28	0.5944	0.7391	1.3531	0.8042	32
29	0.5946	0.7395	1.3522	0.8040	31
30	0.5948	0.7400	1.3514	0.8039	30
31	0.5951	0.7404	1.3506	0.8037	29
32	0.5953	0.7409	1.3498	0.8035	28
33	0.5955	0.7413	1.3490	0.8033	27
34	0.5958	0.7418	1.3481	0.8032	26
35	0.5960	0.7422	1.3473	0.8030	25
36	0.5962	0.7427	1.3465	0.8028	24
37	0.5965	0.7431	1.3457	0.8026	23
38	0.5967	0.7436	1.3449	0.8025	22
39	0.5969	0.7440	1.3440	0.8023	21
40	0.5972	0.7445	1.3432	0.8021	20
41	0.5974	0.7449	1.3424	0.8019	19
42	0.5976	0.7454	1.3416	0.8018	18
43	0.5979	0.7458	1.3408	0.8016	17
44	0.5981	0.7463	1.3400	0.8014	16
45	0.5983	0.7467	1.3392	0.8013	15
46	0.5986	0.7472	1.3384	0.8011	14
47	0.5988	0.7476	1.3375	0.8009	13
48	0.5990	0.7481	1.3367	0.8007	12
49	0.5993	0.7485	1.3359	0.8006	11
50	0.5995	0.7490	1.3351	0.8004	10
51	0.5997	0.7495	1.3343	0.8002	9
52	0.6000	0.7499	1.3335	0.8000	8
53	0.6002	0.7504	1.3327	0.7999	7
54	0.6004	0.7508	1.3319	0.7997	6
55	0.6007	0.7513	1.3311	0.7995	5
56	0.6009	0.7517	1.3303	0.7993	4
57	0.6011	0.7522	1.3295	0.7992	3
58	0.6014	0.7526	1.3287	0.7990	2
59	0.6016	0.7531	1.3278	0.7988	1
60	0.6018	0.7536	1.3270	0.7986	0
	Cos	Cot	Tan	Sin	

′	Sin	Tan	Cot	Cos	
0	0.6018	0.7536	1.3270	0.7986	60
1	0.6020	0.7540	1.3262	0.7985	59
2	0.6023	0.7545	1.3254	0.7983	58
3	0.6025	0.7549	1.3246	0.7981	57
4	0.6027	0.7554	1.3238	0.7979	56
5	0.6030	0.7558	1.3230	0.7978	55
6	0.6032	0.7563	1.3222	0.7976	54
7	0.6034	0.7568	1.3214	0.7974	53
8	0.6037	0.7572	1.3206	0.7972	52
9	0.6039	0.7577	1.3198	0.7971	51
10	0.6041	0.7581	1.3190	0.7969	50
11	0.6044	0.7586	1.3182	0.7967	49
12	0.6046	0.7590	1.3175	0.7965	48
13	0.6048	0.7595	1.3167	0.7964	47
14	0.6051	0.7600	1.3159	0.7962	46
15	0.6053	0.7604	1.3151	0.7960	45
16	0.6055	0.7609	1.3143	0.7958	44
17	0.6058	0.7613	1.3135	0.7956	43
18	0.6060	0.7618	1.3127	0.7955	42
19	0.6062	0.7623	1.3119	0.7953	41
20	0.6065	0.7627	1.3111	0.7951	40
21	0.6067	0.7632	1.3103	0.7949	39
22	0.6069	0.7636	1.3095	0.7948	38
23	0.6071	0.7641	1.3087	0.7946	37
24	0.6074	0.7646	1.3079	0.7944	36
25	0.6076	0.7650	1.3072	0.7942	35
26	0.6078	0.7655	1.3064	0.7941	34
27	0.6081	0.7659	1.3056	0.7939	33
28	0.6083	0.7664	1.3048	0.7937	32
29	0.6085	0.7669	1.3040	0.7935	31
30	0.6088	0.7673	1.3032	0.7934	30
31	0.6090	0.7678	1.3024	0.7932	29
32	0.6092	0.7683	1.3017	0.7930	28
33	0.6095	0.7687	1.3009	0.7928	27
34	0.6097	0.7692	1.3001	0.7926	26
35	0.6099	0.7696	1.2993	0.7925	25
36	0.6101	0.7701	1.2985	0.7923	24
37	0.6104	0.7706	1.2977	0.7921	23
38	0.6106	0.7710	1.2970	0.7919	22
39	0.6108	0.7715	1.2962	0.7918	21
40	0.6111	0.7720	1.2954	0.7916	20
41	0.6113	0.7724	1.2946	0.7914	19
42	0.6115	0.7729	1.2938	0.7912	18
43	0.6118	0.7734	1.2931	0.7910	17
44	0.6120	0.7738	1.2923	0.7909	16
45	0.6122	0.7743	1.2915	0.7907	15
46	0.6124	0.7747	1.2907	0.7905	14
47	0.6127	0.7752	1.2900	0.7903	13
48	0.6129	0.7757	1.2892	0.7902	12
49	0.6131	0.7761	1.2884	0.7900	11
50	0.6134	0.7766	1.2876	0.7898	10
51	0.6136	0.7771	1.2869	0.7896	9
52	0.6138	0.7775	1.2861	0.7894	8
53	0.6141	0.7780	1.2853	0.7893	7
54	0.6143	0.7785	1.2846	0.7891	6
55	0.6145	0.7789	1.2838	0.7889	5
56	0.6147	0.7794	1.2830	0.7887	4
57	0.6150	0.7799	1.2822	0.7885	3
58	0.6152	0.7803	1.2815	0.7884	2
59	0.6154	0.7808	1.2807	0.7882	1
60	0.6157	0.7813	1.2799	0.7880	0
	Cos	Cot	Tan	Sin	

*143° 233° *323° **53°** NATURAL **52°** *142° 232° *322°

*128° 218° *308° **38°** NATURAL **39°** *129° 219° *309°

′	Sin	Tan	Cot	Cos	
0	0.6157	0.7813	1.2799	0.7880	60
1	0.6159	0.7818	1.2792	0.7878	59
2	0.6161	0.7822	1.2784	0.7877	58
3	0.6163	0.7827	1.2776	0.7875	57
4	0.6166	0.7832	1.2769	0.7873	56
5	0.6168	0.7836	1.2761	0.7871	55
6	0.6170	0.7841	1.2753	0.7869	54
7	0.6173	0.7846	1.2746	0.7868	53
8	0.6175	0.7850	1.2738	0.7866	52
9	0.6177	0.7855	1.2731	0.7864	51
10	0.6180	0.7860	1.2723	0.7862	50
11	0.6182	0.7865	1.2715	0.7860	49
12	0.6184	0.7869	1.2708	0.7859	48
13	0.6186	0.7874	1.2700	0.7857	47
14	0.6189	0.7879	1.2693	0.7855	46
15	0.6191	0.7883	1.2685	0.7853	45
16	0.6193	0.7888	1.2677	0.7851	44
17	0.6196	0.7893	1.2670	0.7850	43
18	0.6198	0.7898	1.2662	0.7848	42
19	0.6200	0.7902	1.2655	0.7846	41
20	0.6202	0.7907	1.2647	0.7844	40
21	0.6205	0.7912	1.2640	0.7842	39
22	0.6207	0.7916	1.2632	0.7841	38
23	0.6209	0.7921	1.2624	0.7839	37
24	0.6211	0.7926	1.2617	0.7837	36
25	0.6214	0.7931	1.2609	0.7835	35
26	0.6216	0.7935	1.2602	0.7833	34
27	0.6218	0.7940	1.2594	0.7832	33
28	0.6221	0.7945	1.2587	0.7830	32
29	0.6223	0.7950	1.2579	0.7828	31
30	0.6225	0.7954	1.2572	0.7826	30
31	0.6227	0.7959	1.2564	0.7824	29
32	0.6230	0.7964	1.2557	0.7822	28
33	0.6232	0.7969	1.2549	0.7821	27
34	0.6234	0.7973	1.2542	0.7819	26
35	0.6237	0.7978	1.2534	0.7817	25
36	0.6239	0.7983	1.2527	0.7815	24
37	0.6241	0.7988	1.2519	0.7813	23
38	0.6243	0.7992	1.2512	0.7812	22
39	0.6246	0.7997	1.2504	0.7810	21
40	0.6248	0.8002	1.2497	0.7808	20
41	0.6250	0.8007	1.2489	0.7806	19
42	0.6252	0.8012	1.2482	0.7804	18
43	0.6255	0.8016	1.2475	0.7802	17
44	0.6257	0.8021	1.2467	0.7801	16
45	0.6259	0.8026	1.2460	0.7799	15
46	0.6262	0.8031	1.2452	0.7797	14
47	0.6264	0.8035	1.2445	0.7795	13
48	0.6266	0.8040	1.2437	0.7793	12
49	0.6268	0.8045	1.2430	0.7792	11
50	0.6271	0.8050	1.2423	0.7790	10
51	0.6273	0.8055	1.2415	0.7788	9
52	0.6275	0.8059	1.2408	0.7786	8
53	0.6277	0.8064	1.2401	0.7784	7
54	0.6280	0.8069	1.2393	0.7782	6
55	0.6282	0.8074	1.2386	0.7781	5
56	0.6284	0.8079	1.2378	0.7779	4
57	0.6286	0.8083	1.2371	0.7777	3
58	0.6289	0.8088	1.2364	0.7775	2
59	0.6291	0.8093	1.2356	0.7773	1
60	0.6293	0.8098	1.2349	0.7771	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.6293	0.8098	1.2349	0.7771	60
1	0.6295	0.8103	1.2342	0.7770	59
2	0.6298	0.8107	1.2334	0.7768	58
3	0.6300	0.8112	1.2327	0.7766	57
4	0.6302	0.8117	1.2320	0.7764	56
5	0.6305	0.8122	1.2312	0.7762	55
6	0.6307	0.8127	1.2305	0.7760	54
7	0.6309	0.8132	1.2298	0.7759	53
8	0.6311	0.8136	1.2290	0.7757	52
9	0.6314	0.8141	1.2283	0.7755	51
10	0.6316	0.8146	1.2276	0.7753	50
11	0.6318	0.8151	1.2268	0.7751	49
12	0.6320	0.8156	1.2261	0.7749	48
13	0.6323	0.8161	1.2254	0.7748	47
14	0.6325	0.8165	1.2247	0.7746	46
15	0.6327	0.8170	1.2239	0.7744	45
16	0.6329	0.8175	1.2232	0.7742	44
17	0.6332	0.8180	1.2225	0.7740	43
18	0.6334	0.8185	1.2218	0.7738	42
19	0.6336	0.8190	1.2210	0.7737	41
20	0.6338	0.8195	1.2203	0.7735	40
21	0.6341	0.8199	1.2196	0.7733	39
22	0.6343	0.8204	1.2189	0.7731	38
23	0.6345	0.8209	1.2181	0.7729	37
24	0.6347	0.8214	1.2174	0.7727	36
25	0.6350	0.8219	1.2167	0.7725	35
26	0.6352	0.8224	1.2160	0.7724	34
27	0.6354	0.8229	1.2153	0.7722	33
28	0.6356	0.8234	1.2145	0.7720	32
29	0.6359	0.8238	1.2138	0.7718	31
30	0.6361	0.8243	1.2131	0.7716	30
31	0.6363	0.8248	1.2124	0.7714	29
32	0.6365	0.8253	1.2117	0.7713	28
33	0.6368	0.8258	1.2109	0.7711	27
34	0.6370	0.8263	1.2102	0.7709	26
35	0.6372	0.8268	1.2095	0.7707	25
36	0.6374	0.8273	1.2088	0.7705	24
37	0.6376	0.8278	1.2081	0.7703	23
38	0.6379	0.8283	1.2074	0.7701	22
39	0.6381	0.8287	1.2066	0.7700	21
40	0.6383	0.8292	1.2059	0.7698	20
41	0.6385	0.8297	1.2052	0.7696	19
42	0.6388	0.8302	1.2045	0.7694	18
43	0.6390	0.8307	1.2038	0.7692	17
44	0.6392	0.8312	1.2031	0.7690	16
45	0.6394	0.8317	1.2024	0.7688	15
46	0.6397	0.8322	1.2017	0.7687	14
47	0.6399	0.8327	1.2009	0.7685	13
48	0.6401	0.8332	1.2002	0.7683	12
49	0.6403	0.8337	1.1995	0.7681	11
50	0.6406	0.8342	1.1988	0.7679	10
51	0.6408	0.8346	1.1981	0.7677	9
52	0.6410	0.8351	1.1974	0.7675	8
53	0.6412	0.8356	1.1967	0.7674	7
54	0.6414	0.8361	1.1960	0.7672	6
55	0.6417	0.8366	1.1953	0.7670	5
56	0.6419	0.8371	1.1946	0.7668	4
57	0.6421	0.8376	1.1939	0.7666	3
58	0.6423	0.8381	1.1932	0.7664	2
59	0.6426	0.8386	1.1925	0.7662	1
60	0.6428	0.8391	1.1918	0.7660	0
	Cos	Cot	Tan	Sin	′

*141° 231° *321° **51°** NATURAL **50°** *140° 230° *320°

*130° 220° *310° **40°** NATURAL **41°** *131° 221° *311°

	Sin	Tan	Cot	Cos	
0	0.6428	0.8391	1.1518	0.7660	60
1	0.6430	0.8396	1.1910	0.7659	59
2	0.6432	0.8401	1.1903	0.7657	58
3	0.6435	0.8406	1.1896	0.7655	57
4	0.6437	0.8411	1.1889	0.7653	56
5	0.6439	0.8416	1.1882	0.7651	55
6	0.6441	0.8421	1.1875	0.7649	54
7	0.6443	0.8426	1.1868	0.7647	53
8	0.6446	0.8431	1.1861	0.7645	52
9	0.6448	0.8436	1.1854	0.7644	51
10	0.6450	0.8441	1.1847	0.7642	50
11	0.6452	0.8446	1.1840	0.7640	49
12	0.6455	0.8451	1.1833	0.7638	48
13	0.6457	0.8456	1.1826	0.7636	47
14	0.6459	0.8461	1.1819	0.7634	46
15	0.6461	0.8466	1.1812	0.7632	45
16	0.6463	0.8471	1.1806	0.7630	44
17	0.6466	0.8476	1.1799	0.7629	43
18	0.6468	0.8481	1.1792	0.7627	42
19	0.6470	0.8486	1.1785	0.7625	41
20	0.6472	0.8491	1.1778	0.7623	40
21	0.6475	0.8496	1.1771	0.7621	39
22	0.6477	0.8501	1.1764	0.7619	38
23	0.6479	0.8506	1.1757	0.7617	37
24	0.6481	0.8511	1.1750	0.7615	36
25	0.6483	0.8516	1.1743	0.7613	35
26	0.6486	0.8521	1.1736	0.7612	34
27	0.6488	0.8526	1.1729	0.7610	33
28	0.6490	0.8531	1.1722	0.7608	32
29	0.6492	0.8536	1.1715	0.7606	31
30	0.6494	0.8541	1.1708	0.7604	30
31	0.6497	0.8546	1.1702	0.7602	29
32	0.6499	0.8551	1.1695	0.7600	28
33	0.6501	0.8556	1.1688	0.7598	27
34	0.6503	0.8561	1.1681	0.7596	26
35	0.6506	0.8566	1.1674	0.7595	25
36	0.6508	0.8571	1.1667	0.7593	24
37	0.6510	0.8576	1.1660	0.7591	23
38	0.6512	0.8581	1.1653	0.7589	22
39	0.6514	0.8586	1.1647	0.7587	21
40	0.6517	0.8591	1.1640	0.7585	20
41	0.6519	0.8596	1.1633	0.7583	19
42	0.6521	0.8601	1.1626	0.7581	18
43	0.6523	0.8606	1.1619	0.7579	17
44	0.6525	0.8611	1.1612	0.7578	16
45	0.6528	0.8617	1.1606	0.7576	15
46	0.6530	0.8622	1.1599	0.7574	14
47	0.6532	0.8627	1.1592	0.7572	13
48	0.6534	0.8632	1.1585	0.7570	12
49	0.6536	0.8637	1.1578	0.7568	11
50	0.6539	0.8642	1.1571	0.7566	10
51	0.6541	0.8647	1.1565	0.7564	9
52	0.6543	0.8652	1.1558	0.7562	8
53	0.6545	0.8657	1.1551	0.7560	7
54	0.6547	0.8662	1.1544	0.7559	6
55	0.6550	0.8667	1.1538	0.7557	5
56	0.6552	0.8672	1.1531	0.7555	4
57	0.6554	0.8678	1.1524	0.7553	3
58	0.6556	0.8683	1.1517	0.7551	2
59	0.6558	0.8688	1.1510	0.7549	1
60	0.6561	0.8693	1.1504	0.7547	0
	Cos	Cot	Tan	Sin	

	Sin	Tan	Cot	Cos	
0	0.6561	0.8693	1.1504	0.7547	60
1	0.6563	0.8698	1.1497	0.7545	59
2	0.6565	0.8703	1.1490	0.7543	58
3	0.6567	0.8708	1.1483	0.7541	57
4	0.6569	0.8713	1.1477	0.7539	56
5	0.6572	0.8718	1.1470	0.7538	55
6	0.6574	0.8724	1.1463	0.7536	54
7	0.6576	0.8729	1.1456	0.7534	53
8	0.6578	0.8734	1.1450	0.7532	52
9	0.6580	0.8739	1.1443	0.7530	51
10	0.6583	0.8744	1.1436	0.7528	50
11	0.6585	0.8749	1.1430	0.7526	49
12	0.6587	0.8754	1.1423	0.7524	48
13	0.6589	0.8759	1.1416	0.7522	47
14	0.6591	0.8765	1.1410	0.7520	46
15	0.6593	0.8770	1.1403	0.7518	45
16	0.6596	0.8775	1.1396	0.7516	44
17	0.6598	0.8780	1.1389	0.7515	43
18	0.6600	0.8785	1.1383	0.7513	42
19	0.6602	0.8790	1.1376	0.7511	41
20	0.6604	0.8796	1.1369	0.7509	40
21	0.6607	0.8801	1.1363	0.7507	39
22	0.6609	0.8806	1.1356	0.7505	38
23	0.6611	0.8811	1.1349	0.7503	37
24	0.6613	0.8816	1.1343	0.7501	36
25	0.6615	0.8821	1.1336	0.7499	35
26	0.6617	0.8827	1.1329	0.7497	34
27	0.6620	0.8832	1.1323	0.7495	33
28	0.6622	0.8837	1.1316	0.7493	32
29	0.6624	0.8842	1.1310	0.7491	31
30	0.6626	0.8847	1.1303	0.7490	30
31	0.6628	0.8852	1.1296	0.7488	29
32	0.6631	0.8858	1.1290	0.7486	28
33	0.6633	0.8863	1.1283	0.7484	27
34	0.6635	0.8868	1.1276	0.7482	26
35	0.6637	0.8873	1.1270	0.7480	25
36	0.6639	0.8878	1.1263	0.7478	24
37	0.6641	0.8884	1.1257	0.7476	23
38	0.6644	0.8889	1.1250	0.7474	22
39	0.6646	0.8894	1.1243	0.7472	21
40	0.6648	0.8899	1.1237	0.7470	20
41	0.6650	0.8904	1.1230	0.7468	19
42	0.6652	0.8910	1.1224	0.7466	18
43	0.6654	0.8915	1.1217	0.7464	17
44	0.6657	0.8920	1.1211	0.7463	16
45	0.6659	0.8925	1.1204	0.7461	15
46	0.6661	0.8931	1.1197	0.7459	14
47	0.6663	0.8936	1.1191	0.7457	13
48	0.6665	0.8941	1.1184	0.7455	12
49	0.6667	0.8946	1.1178	0.7453	11
50	0.6670	0.8952	1.1171	0.7451	10
51	0.6672	0.8957	1.1165	0.7449	9
52	0.6674	0.8962	1.1158	0.7447	8
53	0.6676	0.8967	1.1152	0.7445	7
54	0.6678	0.8972	1.1145	0.7443	6
55	0.6680	0.8978	1.1139	0.7441	5
56	0.6683	0.8983	1.1132	0.7439	4
57	0.6685	0.8988	1.1126	0.7437	3
58	0.6687	0.8994	1.1119	0.7435	2
59	0.6689	0.8999	1.1113	0.7433	1
60	0.6691	0.9004	1.1106	0.7431	0
	Cos	Cot	Tan	Sin	

*139° 229° *319° **49°** NATURAL **48°** *138° 228° *318°

*132° 222° *312° **42°** NATURAL **43°** *133° 223° *313°

′	Sin	Tan	Cot	Cos	
0	0.6691	0.9004	1.1106	0.7431	60
1	0.6693	0.9009	1.1100	0.7430	59
2	0.6696	0.9015	1.1093	0.7428	58
3	0.6698	0.9020	1.1087	0.7426	57
4	0.6700	0.9025	1.1080	0.7424	56
5	0.6702	0.9030	1.1074	0.7422	55
6	0.6704	0.9036	1.1067	0.7420	54
7	0.6706	0.9041	1.1061	0.7418	53
8	0.6709	0.9046	1.1054	0.7416	52
9	0.6711	0.9052	1.1048	0.7414	51
10	0.6713	0.9057	1.1041	0.7412	50
11	0.6715	0.9062	1.1035	0.7410	49
12	0.6717	0.9067	1.1028	0.7408	48
13	0.6719	0.9073	1.1022	0.7406	47
14	0.6722	0.9078	1.1016	0.7404	46
15	0.6724	0.9083	1.1009	0.7402	45
16	0.6726	0.9089	1.1003	0.7400	44
17	0.6728	0.9094	1.0996	0.7398	43
18	0.6730	0.9099	1.0990	0.7396	42
19	0.6732	0.9105	1.0983	0.7394	41
20	0.6734	0.9110	1.0977	0.7392	40
21	0.6737	0.9115	1.0971	0.7390	39
22	0.6739	0.9121	1.0964	0.7388	38
23	0.6741	0.9126	1.0958	0.7387	37
24	0.6743	0.9131	1.0951	0.7385	36
25	0.6745	0.9137	1.0945	0.7383	35
26	0.6747	0.9142	1.0939	0.7381	34
27	0.6749	0.9147	1.0932	0.7379	33
28	0.6752	0.9153	1.0926	0.7377	32
29	0.6754	0.9158	1.0919	0.7375	31
30	0.6756	0.9163	1.0913	0.7373	30
31	0.6758	0.9169	1.0907	0.7371	29
32	0.6760	0.9174	1.0900	0.7369	28
33	0.6762	0.9179	1.0894	0.7367	27
34	0.6764	0.9185	1.0888	0.7365	26
35	0.6767	0.9190	1.0881	0.7363	25
36	0.6769	0.9195	1.0875	0.7361	24
37	0.6771	0.9201	1.0869	0.7359	23
38	0.6773	0.9206	1.0862	0.7357	22
39	0.6775	0.9212	1.0856	0.7355	21
40	0.6777	0.9217	1.0850	0.7353	20
41	0.6779	0.9222	1.0843	0.7351	19
42	0.6782	0.9228	1.0837	0.7349	18
43	0.6784	0.9233	1.0831	0.7347	17
44	0.6786	0.9239	1.0824	0.7345	16
45	0.6788	0.9244	1.0818	0.7343	15
46	0.6790	0.9249	1.0812	0.7341	14
47	0.6792	0.9255	1.0805	0.7339	13
48	0.6794	0.9260	1.0799	0.7337	12
49	0.6797	0.9266	1.0793	0.7335	11
50	0.6799	0.9271	1.0786	0.7333	10
51	0.6801	0.9276	1.0780	0.7331	9
52	0.6803	0.9282	1.0774	0.7329	8
53	0.6805	0.9287	1.0768	0.7327	7
54	0.6807	0.9293	1.0761	0.7325	6
55	0.6809	0.9298	1.0755	0.7323	5
56	0.6811	0.9303	1.0749	0.7321	4
57	0.6814	0.9309	1.0742	0.7319	3
58	0.6816	0.9314	1.0736	0.7318	2
59	0.6818	0.9320	1.0730	0.7316	1
60	0.6820	0.9325	1.0724	0.7314	0
	Cos	Cot	Tan	Sin	′

′	Sin	Tan	Cot	Cos	
0	0.6820	0.9325	1.0724	0.7314	60
1	0.6822	0.9331	1.0717	0.7312	59
2	0.6824	0.9336	1.0711	0.7310	58
3	0.6826	0.9341	1.0705	0.7308	57
4	0.6828	0.9347	1.0699	0.7306	56
5	0.6831	0.9352	1.0692	0.7304	55
6	0.6833	0.9358	1.0686	0.7302	54
7	0.6835	0.9363	1.0680	0.7300	53
8	0.6837	0.9369	1.0674	0.7298	52
9	0.6839	0.9374	1.0668	0.7296	51
10	0.6841	0.9380	1.0661	0.7294	50
11	0.6843	0.9385	1.0655	0.7292	49
12	0.6845	0.9391	1.0649	0.7290	48
13	0.6848	0.9396	1.0643	0.7288	47
14	0.6850	0.9402	1.0637	0.7286	46
15	0.6852	0.9407	1.0630	0.7284	45
16	0.6854	0.9413	1.0624	0.7282	44
17	0.6856	0.9418	1.0618	0.7280	43
18	0.6858	0.9424	1.0612	0.7278	42
19	0.6860	0.9429	1.0606	0.7276	41
20	0.6862	0.9435	1.0599	0.7274	40
21	0.6865	0.9440	1.0593	0.7272	39
22	0.6867	0.9446	1.0587	0.7270	38
23	0.6869	0.9451	1.0581	0.7268	37
24	0.6871	0.9457	1.0575	0.7266	36
25	0.6873	0.9462	1.0569	0.7264	35
26	0.6875	0.9468	1.0562	0.7262	34
27	0.6877	0.9473	1.0556	0.7260	33
28	0.6879	0.9479	1.0550	0.7258	32
29	0.6881	0.9484	1.0544	0.7256	31
30	0.6884	0.9490	1.0538	0.7254	30
31	0.6886	0.9495	1.0532	0.7252	29
32	0.6888	0.9501	1.0526	0.7250	28
33	0.6890	0.9506	1.0519	0.7248	27
34	0.6892	0.9512	1.0513	0.7246	26
35	0.6894	0.9517	1.0507	0.7244	25
36	0.6896	0.9523	1.0501	0.7242	24
37	0.6898	0.9528	1.0495	0.7240	23
38	0.6900	0.9534	1.0489	0.7238	22
39	0.6903	0.9540	1.0483	0.7236	21
40	0.6905	0.9545	1.0477	0.7234	20
41	0.6907	0.9551	1.0470	0.7232	19
42	0.6909	0.9556	1.0464	0.7230	18
43	0.6911	0.9562	1.0458	0.7228	17
44	0.6913	0.9567	1.0452	0.7226	16
45	0.6915	0.9573	1.0446	0.7224	15
46	0.6917	0.9578	1.0440	0.7222	14
47	0.6919	0.9584	1.0434	0.7220	13
48	0.6921	0.9590	1.0428	0.7218	12
49	0.6924	0.9595	1.0422	0.7216	11
50	0.6926	0.9601	1.0416	0.7214	10
51	0.6928	0.9606	1.0410	0.7212	9
52	0.6930	0.9612	1.0404	0.7210	8
53	0.6932	0.9618	1.0398	0.7208	7
54	0.6934	0.9623	1.0392	0.7206	6
55	0.6936	0.9629	1.0385	0.7203	5
56	0.6938	0.9634	1.0379	0.7201	4
57	0.6940	0.9640	1.0373	0.7199	3
58	0.6942	0.9646	1.0367	0.7197	2
59	0.6944	0.9651	1.0361	0.7195	1
60	0.6947	0.9657	1.0355	0.7193	0
	Cos	Cot	Tan	Sin	′

*137° 227° *317° **47°** NATURAL **46°** *136° 226° *316°

NATURAL 44° *134° 224° *314°

	Sin	Tan	Cot	Cos	
0	0.6947	0.9657	1.0355	0.7193	60
1	0.6949	0.9663	1.0349	0.7191	59
2	0.6951	0.9668	1.0343	0.7189	58
3	0.6953	0.9674	1.0337	0.7187	57
4	0.6955	0.9679	1.0331	0.7185	56
5	0.6957	0.9685	1.0325	0.7183	55
6	0.6959	0.9691	1.0319	0.7181	54
7	0.6961	0.9696	1.0313	0.7179	53
8	0.6963	0.9702	1.0307	0.7177	52
9	0.6965	0.9708	1.0301	0.7175	51
10	0.6967	0.9713	1.0295	0.7173	50
11	0.6970	0.9719	1.0289	0.7171	49
12	0.6972	0.9725	1.0283	0.7169	48
13	0.6974	0.9730	1.0277	0.7167	47
14	0.6976	0.9736	1.0271	0.7165	46
15	0.6978	0.9742	1.0265	0.7163	45
16	0.6980	0.9747	1.0259	0.7161	44
17	0.6982	0.9753	1.0253	0.7159	43
18	0.6984	0.9759	1.0247	0.7157	42
19	0.6986	0.9764	1.0241	0.7155	41
20	0.6988	0.9770	1.0235	0.7153	40
21	0.6990	0.9776	1.0230	0.7151	39
22	0.6992	0.9781	1.0224	0.7149	38
23	0.6995	0.9787	1.0218	0.7147	37
24	0.6997	0.9793	1.0212	0.7145	36
25	0.6999	0.9798	1.0206	0.7143	35
26	0.7001	0.9804	1.0200	0.7141	34
27	0.7003	0.9810	1.0194	0.7139	33
28	0.7005	0.9816	1.0188	0.7137	32
29	0.7007	0.9821	1.0182	0.7135	31
30	0.7009	0.9827	1.0176	0.7133	30
31	0.7011	0.9833	1.0170	0.7130	29
32	0.7013	0.9838	1.0164	0.7128	28
33	0.7015	0.9844	1.0158	0.7126	27
34	0.7017	0.9850	1.0152	0.7124	26
35	0.7019	0.9856	1.0147	0.7122	25
36	0.7022	0.9861	1.0141	0.7120	24
37	0.7024	0.9867	1.0135	0.7118	23
38	0.7026	0.9873	1.0129	0.7116	22
39	0.7028	0.9879	1.0123	0.7114	21
40	0.7030	0.9884	1.0117	0.7112	20
41	0.7032	0.9890	1.0111	0.7110	19
42	0.7034	0.9896	1.0105	0.7108	18
43	0.7036	0.9902	1.0099	0.7106	17
44	0.7038	0.9907	1.0094	0.7104	16
45	0.7040	0.9913	1.0088	0.7102	15
46	0.7042	0.9919	1.0082	0.7100	14
47	0.7044	0.9925	1.0076	0.7098	13
48	0.7046	0.9930	1.0070	0.7096	12
49	0.7048	0.9936	1.0064	0.7094	11
50	0.7050	0.9942	1.0058	0.7092	10
51	0.7053	0.9948	1.0052	0.7090	9
52	0.7055	0.9954	1.0047	0.7088	8
53	0.7057	0.9959	1.0041	0.7085	7
54	0.7059	0.9965	1.0035	0.7083	6
55	0.7061	0.9971	1.0029	0.7081	5
56	0.7063	0.9977	1.0023	0.7079	4
57	0.7065	0.9983	1.0017	0.7077	3
58	0.7067	0.9988	1.0012	0.7075	2
59	0.7069	0.9994	1.0006	0.7073	1
60	0.7071	1.0000	1.0000	0.7071	0
	Cos	Cot	Tan	Sin	

*135° 225° *315° 45° NATURAL

VI

TABLE OF SQUARES, CUBES, SQUARE ROOTS AND CUBE ROOTS

OF

WHOLE NUMBERS FROM 1 TO 1020.

The numbers are given in the columns headed N, their squares, cubes, square roots and cube roots respectively in the columns headed N^2, N^3. $\sqrt{N}$ and $\sqrt[3]{N}$

0—60

N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$
0	0	0	0.0000	0.0000	30	900	27000	5.4772	3.1072
1	1	1	1.0000	1.0000	31	961	29791	5.5678	3.1414
2	4	8	1.4142	1.2599	32	1024	32768	5.6569	3.1748
3	9	27	1.7321	1.4422	33	1089	35937	5.7446	3.2075
4	16	64	2.0000	1.5874	34	1156	39304	5.8310	3.2396
5	25	125	2.2361	1.7100	35	1225	42875	5.9161	3.2711
6	36	216	2.4495	1.8171	36	1296	46656	6.0000	3.3019
7	49	343	2.6458	1.9129	37	1369	50653	6.0828	3.3322
8	64	512	2.8284	2.0000	38	1444	54872	6.1644	3.3620
9	81	729	3.0000	2.0801	39	1521	59319	6.2450	3.3912
10	100	1000	3.1623	2.1544	40	1600	64000	6.3246	3.4200
11	121	1331	3.3166	2.2240	41	1681	68921	6.4031	3.4482
12	144	1728	3.4641	2.2894	42	1764	74088	6.4807	3.4760
13	169	2197	3.6056	2.3513	43	1849	79507	6.5574	3.5034
14	196	2744	3.7417	2.4101	44	1936	85184	6.6332	3.5303
15	225	3375	3.8730	2.4662	45	2025	91125	6.7082	3.5569
16	256	4096	4.0000	2.5198	46	2116	97336	6.7823	3.5830
17	289	4913	4.1231	2.5713	47	2209	103823	6.8557	3.6088
18	324	5832	4.2426	2.6207	48	2304	110592	6.9282	3.6342
19	361	6859	4.3589	2.6684	49	2401	117649	7.0000	3.6593
20	400	8000	4.4721	2.7144	50	2500	125000	7.0711	3.6840
21	441	9261	4.5826	2.7589	51	2601	132651	7.1414	3.7084
22	484	10648	4.6904	2.8020	52	2704	140608	7.2111	3.7325
23	529	12167	4.7958	2.8439	53	2809	148877	7.2801	3.7563
24	576	13824	4.8990	2.8845	54	2916	157464	7.3485	3.7798
25	625	15625	5.0000	2.9240	55	3025	166375	7.4162	3.8030
26	676	17576	5.0990	2.9625	56	3136	175616	7.4833	3.8259
27	729	19683	5.1962	3.0000	57	3249	185193	7.5498	3.8485
28	784	21952	5.2915	3.0366	58	3364	195112	7.6158	3.8709
29	841	24389	5.3852	3.0723	59	3481	205379	7.6811	3.8930
30	900	27000	5.4772	3.1072	60	3600	216000	7.7460	3.9149
N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$

60—180

N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$
60	3600	216000	7.7460	3.9149	120	14400	1728000	10.9545	4.9324
61	3721	226981	7.8102	3.9365	121	14641	1771561	11.0000	4.9461
62	3844	238328	7.8740	3.9579	122	14884	1815848	11.0454	4.9597
63	3969	250047	7.9373	3.9791	123	15129	1860867	11.0905	4.9732
64	4096	262144	8.0000	4.0000	124	15376	1906624	11.1355	4.9866
65	4225	274625	8.0623	4.0207	125	15625	1953125	11.1803	5.0000
66	4356	287496	8.1240	4.0412	126	15876	2000376	11.2250	5.0133
67	4489	300763	8.1854	4.0615	127	16129	2048383	11.2694	5.0265
68	4624	314432	8.2462	4.0817	128	16384	2097152	11.3137	5.0397
69	4761	328509	8.3066	4.1016	129	16641	2146689	11.3578	5.0528
70	4900	343000	8.3666	4.1213	130	16900	2197000	11.4018	5.0658
71	5041	357911	8.4261	4.1408	131	17161	2248091	11.4455	5.0788
72	5184	373248	8.4853	4.1602	132	17424	2299968	11.4891	5.0916
73	5329	389017	8.5440	4.1793	133	17689	2352637	11.5326	5.1045
74	5476	405224	8.6023	4.1983	134	17956	2406104	11.5758	5.1172
75	5625	421875	8.6603	4.2172	135	18225	2460375	11.6190	5.1299
76	5776	438976	8.7178	4.2358	136	18496	2515456	11.6619	5.1426
77	5929	456533	8.7750	4.2543	137	18769	2571353	11.7047	5.1551
78	6084	474552	8.8318	4.2727	138	19044	2628072	11.7473	5.1676
79	6241	493039	8.8882	4.2908	139	19321	2685619	11.7898	5.1801
80	6400	512000	8.9443	4.3089	140	19600	2744000	11.8322	5.1925
81	6561	531441	9.0000	4.3267	141	19881	2803221	11.8743	5.2048
82	6724	551368	9.0554	4.3445	142	20164	2863288	11.9164	5.2171
83	6889	571787	9.1104	4.3621	143	20449	2924207	11.9583	5.2293
84	7056	592704	9.1652	4.3795	144	20736	2985984	12.0000	5.2415
85	7225	614125	9.2195	4.3968	145	21025	3048625	12.0416	5.2536
86	7396	636056	9.2736	4.4140	146	21316	3112136	12.0830	5.2656
87	7569	658503	9.3274	4.4310	147	21609	3176523	12.1244	5.2776
88	7744	681472	9.3808	4.4480	148	21904	3241792	12.1655	5.2896
89	7921	704969	9.4340	4.4647	149	22201	3307949	12.2066	5.3015
90	8100	729000	9.4868	4.4814	150	22500	3375000	12.2474	5.3133
91	8281	753571	9.5394	4.4979	151	22801	3442951	12.2882	5.3251
92	8464	778688	9.5917	4.5144	152	23104	3511808	12.3288	5.3368
93	8649	804357	9.6437	4.5307	153	23409	3581577	12.3693	5.3485
94	8836	830584	9.6954	4.5468	154	23716	3652264	12.4097	5.3601
95	9025	857375	9.7468	4.5629	155	24025	3723875	12.4499	5.3717
96	9216	884736	9.7980	4.5789	156	24336	3796416	12.4900	5.3832
97	9409	912673	9.8489	4.5947	157	24649	3869893	12.5300	5.3947
98	9604	941192	9.8995	4.6104	158	24964	3944312	12.5698	5.4061
99	9801	970299	9.9499	4.6261	159	25281	4019679	12.6095	5.4175
100	10000	1000000	10.0000	4.6416	160	25600	4096000	12.6491	5.4288
101	10201	1030301	10.0499	4.6570	161	25921	4173281	12.6886	5.4401
102	10404	1061208	10.0995	4.6723	162	26244	4251528	12.7279	5.4514
103	10609	1092727	10.1489	4.6875	163	26569	4330747	12.7671	5.4626
104	10816	1124864	10.1980	4.7027	164	26896	4410944	12.8062	5.4737
105	11025	1157625	10.2470	4.7177	165	27225	4492125	12.8452	5.4848
106	11236	1191016	10.2956	4.7326	166	27556	4574296	12.8841	5.4959
107	11449	1225043	10.3441	4.7475	167	27889	4657463	12.9228	5.5069
108	11664	1259712	10.3923	4.7622	168	28224	4741632	12.9615	5.5178
109	11881	1295029	10.4403	4.7769	169	28561	4826809	13.0000	5.5288
110	12100	1331000	10.4881	4.7914	170	28900	4913000	13.0384	5.5397
111	12321	1367631	10.5357	4.8059	171	29241	5000211	13.0767	5.5505
112	12544	1404928	10.5830	4.8203	172	29584	5088448	13.1149	5.5613
113	12769	1442897	10.6301	4.8346	173	29929	5177717	13.1529	5.5721
114	12996	1481544	10.6771	4.8488	174	30276	5268024	13.1909	5.5828
115	13225	1520875	10.7238	4.8629	175	30625	5359375	13.2288	5.5934
116	13456	1560896	10.7703	4.8770	176	30976	5451776	13.2665	5.6041
117	13689	1601613	10.8167	4.8910	177	31329	5545233	13.3041	5.6147
118	13924	1643032	10.8628	4.9049	178	31684	5639752	13.3417	5.6252
119	14161	1685159	10.9087	4.9187	179	32041	5735339	13.3791	5.6357
120	14400	1728000	10.9545	4.9324	180	32400	5832000	13.4164	5.6462
N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$

180—300

N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$
180	32400	5832000	13.4164	5.6462	240	57600	13824000	15.4919	6.2145
181	32761	5929741	13.4536	5.6567	241	58081	13997521	15.5242	6.2231
182	33124	6028568	13.4907	5.6671	242	58564	14172488	15.5563	6.2317
183	33489	6128487	13.5277	5.6774	243	59049	14348907	15.5885	6.2403
184	33856	6229504	13.5647	5.6877	244	59536	14526784	15.6205	6.2488
185	34225	6331625	13.6015	5.6980	245	60025	14706125	15.6525	6.2573
186	34596	6434856	13.6382	5.7083	246	60516	14886936	15.6844	6.2658
187	34969	6539203	13.6748	5.7185	247	61009	15069223	15.7162	6.2743
188	35344	6644672	13.7113	5.7287	248	61504	15252992	15.7480	6.2828
189	35721	6751269	13.7477	5.7388	249	62001	15438249	15.7797	6.2912
190	36100	6859000	13.7840	5.7489	250	62500	15625000	15.8114	6.2996
191	36481	6967871	13.8203	5.7590	251	63001	15813251	15.8430	6.3080
192	36864	7077888	13.8564	5.7690	252	63504	16003008	15.8745	6.3164
193	37249	7189057	13.8924	5.7790	253	64009	16194277	15.9060	6.3247
194	37636	7301384	13.9284	5.7890	254	64516	16387064	15.9374	6.3330
195	38025	7414875	13.9642	5.7989	255	65025	16581375	15.9687	6.3413
196	38416	7529536	14.0000	5.8088	256	65536	16777216	16.0000	6.3496
197	38809	7645373	14.0357	5.8186	257	66049	16974593	16.0312	6.3579
198	39204	7762392	14.0712	5.8285	258	66564	17173512	16.0624	6.3661
199	39601	7880599	14.1067	5.8383	259	67081	17373979	16.0935	6.3743
200	40000	8000000	14.1421	5.8480	260	67600	17576000	16.1245	6.3825
201	40401	8120601	14.1774	5.8578	261	68121	17779581	16.1555	6.3907
202	40804	8242408	14.2127	5.8675	262	68644	17984728	16.1864	6.3988
203	41209	8365427	14.2478	5.8771	263	69169	18191447	16.2173	6.4070
204	41616	8489664	14.2829	5.8868	264	69696	18399744	16.2481	6.4151
205	42025	8615125	14.3178	5.8964	265	70225	18609625	16.2788	6.4232
206	42436	8741816	14.3527	5.9059	266	70756	18821096	16.3095	6.4312
207	42849	8869743	14.3875	5.9155	267	71289	19034163	16.3401	6.4393
208	43264	8998912	14.4222	5.9250	268	71824	19248832	16.3707	6.4473
209	43681	9129329	14.4568	5.9345	269	72361	19465109	16.4012	6.4553
210	44100	9261000	14.4914	5.9439	270	72900	19683000	16.4317	6.4633
211	44521	9393931	14.5258	5.9533	271	73441	19902511	16.4621	6.4713
212	44944	9528128	14.5602	5.9627	272	73984	20123648	16.4924	6.4792
213	45369	9663597	14.5945	5.9721	273	74529	20346417	16.5227	6.4872
214	45796	9800344	14.6287	5.9814	274	75076	20570824	16.5529	6.4951
215	46225	9938375	14.6629	5.9907	275	75625	20796875	16.5831	6.5030
216	46656	10077696	14.6969	6.0000	276	76176	21024576	16.6132	6.5108
217	47089	10218313	14.7309	6.0092	277	76729	21253933	16.6433	6.5187
218	47524	10360232	14.7648	6.0185	278	77284	21484952	16.6733	6.5265
219	47961	10503459	14.7986	6.0277	279	77841	21717639	16.7033	6.5343
220	48400	10648000	14.8324	6.0368	280	78400	21952000	16.7332	6.5421
221	48841	10793861	14.8661	6.0459	281	78961	22188041	16.7631	6.5499
222	49284	10941048	14.8997	6.0550	282	79524	22425768	16.7929	6.5577
223	49729	11089567	14.9332	6.0641	283	80089	22665187	16.8226	6.5654
224	50176	11239424	14.9666	6.0732	284	80656	22906304	16.8523	6.5731
225	50625	11390625	15.0000	6.0822	285	81225	23149125	16.8819	6.5808
226	51076	11543176	15.0333	6.0912	286	81796	23393656	16.9115	6.5885
227	51529	11697083	15.0665	6.1002	287	82369	23639903	16.9411	6.5962
228	51984	11852352	15.0997	6.1091	288	82944	23887872	16.9705	6.6039
229	52441	12008989	15.1327	6.1180	289	83521	24137569	17.0000	6.6115
230	52900	12167000	15.1658	6.1269	290	84100	24389000	17.0294	6.6191
231	53361	12326391	15.1987	6.1358	291	84681	24642171	17.0587	6.6267
232	53824	12487168	15.2315	6.1446	292	85264	24897088	17.0880	6.6343
233	54289	12649337	15.2643	6.1534	293	85849	25153757	17.1172	6.6419
234	54756	12812904	15.2971	6.1622	294	86436	25412184	17.1464	6.6494
235	55225	12977875	15.3297	6.1710	295	87025	25672375	17.1756	6.6569
236	55696	13144256	15.3623	6.1797	296	87616	25934336	17.2047	6.6644
237	56169	13312053	15.3948	6.1885	297	88209	26198073	17.2337	6.6719
238	56644	13481272	15.4272	6.1972	298	88804	26463592	17.2627	6.6794
239	57121	13651919	15.4596	6.2058	299	89401	26730899	17.2916	6.6869
240	57600	13824000	15.4919	6.2145	300	90000	27000000	17.3205	6.6943
N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^3	N^3	$\sqrt{N}$	$\sqrt[3]{N}$

300—420

N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$
300	90000	27000000	17.3205	6.6943	360	129600	46656000	18.9737	7.1138
301	90601	27270901	17.3494	6.7018	361	130321	47045881	19.0000	7.1204
302	91204	27543608	17.3781	6.7092	362	131044	47437928	19.0263	7.1269
303	91809	27818127	17.4069	6.7166	363	131769	47832147	19.0526	7.1335
304	92416	28094464	17.4356	6.7240	364	132496	48228544	19.0788	7.1400
305	93025	28372625	17.4642	6.7313	365	133225	48627125	19.1050	7.1466
306	93636	28652616	17.4929	6.7387	366	133956	49027896	19.1311	7.1531
307	94249	28934443	17.5214	6.7460	367	134689	49430863	19.1572	7.1596
308	94864	29218112	17.5499	6.7533	368	135424	49836032	19.1833	7.1661
309	95481	29503629	17.5784	6.7606	369	136161	50243409	19.2094	7.1726
310	96100	29791000	17.6068	6.7679	370	136900	50653000	19.2354	7.1791
311	96721	30080231	17.6352	6.7752	371	137641	51064811	19.2614	7.1855
312	97344	30371328	17.6635	6.7824	372	138384	51478848	19.2873	7.1920
313	97969	30664297	17.6918	6.7897	373	139129	51895117	19.3132	7.1984
314	98596	30959144	17.7200	6.7969	374	139876	52313624	19.3391	7.2048
315	99225	31255875	17.7482	6.8041	375	140625	52734375	19.3649	7.2112
316	99856	31554496	17.7764	6.8113	376	141376	53157376	19.3907	7.2177
317	100489	31855013	17.8045	6.8185	377	142129	53582633	19.4165	7.2240
318	101124	32157432	17.8326	6.8256	378	142884	54010152	19.4422	7.2304
319	101761	32461759	17.8606	6.8328	379	143641	54439939	19.4679	7.2368
320	102400	32768000	17.8885	6.8399	380	144400	54872000	19.4936	7.2432
321	103041	33076161	17.9165	6.8470	381	145161	55306341	19.5192	7.2495
322	103684	33386248	17.9444	6.8541	382	145924	55742968	19.5448	7.2558
323	104329	33698267	17.9722	6.8612	383	146689	56181887	19.5704	7.2622
324	104976	34012224	18.0000	6.8683	384	147456	56623104	19.5959	7.2685
325	105625	34328125	18.0278	6.8753	385	148225	57066625	19.6214	7.2748
326	106276	34645976	18.0555	6.8824	386	148996	57512456	19.6469	7.2811
327	106929	34965783	18.0831	6.8894	387	149769	57960603	19.6723	7.2874
328	107584	35287552	18.1108	6.8964	388	150544	58411072	19.6977	7.2936
329	108241	35611289	18.1384	6.9034	389	151321	58863869	19.7231	7.2999
330	108900	35937000	18.1659	6.9104	390	152100	59319000	19.7484	7.3061
331	109561	36264691	18.1934	6.9174	391	152881	59776471	19.7737	7.3124
332	110224	36594368	18.2209	6.9244	392	153664	60236288	19.7990	7.3186
333	110889	36926037	18.2483	6.9313	393	154449	60698457	19.8242	7.3248
334	111556	37259704	18.2757	6.9382	394	155236	61162984	19.8494	7.3310
335	112225	37595375	18.3030	6.9451	395	156025	61629875	19.8746	7.3372
336	112896	37933056	18.3303	6.9521	396	156816	62099136	19.8997	7.3434
337	113569	38272753	18.3576	6.9589	397	157609	62570773	19.9249	7.3496
338	114244	38614472	18.3848	6.9658	398	158404	63044792	19.9499	7.3558
339	114921	38958219	18.4120	6.9727	399	159201	63521199	19.9750	7.3619
340	115600	39304000	18.4391	6.9795	400	160000	64000000	20.0000	7.3681
341	116281	39651821	18.4662	6.9864	401	160801	64481201	20.0250	7.3742
342	116964	40001688	18.4932	6.9932	402	161604	64964808	20.0499	7.3803
343	117649	40353607	18.5203	7.0000	403	162409	65450827	20.0749	7.3864
344	118336	40707584	18.5472	7.0068	404	163216	65939264	20.0998	7.3925
345	119025	41063625	18.5742	7.0136	405	164025	66430125	20.1246	7.3986
346	119716	41421736	18.6011	7.0203	406	164836	66923416	20.1494	7.4047
347	120409	41781923	18.6279	7.0271	407	165649	67419143	20.1742	7.4108
348	121104	42144192	18.6548	7.0338	408	166464	67917312	20.1990	7.4169
349	121801	42508549	18.6815	7.0406	409	167281	68417929	20.2237	7.4229
350	122500	42875000	18.7083	7.0473	410	168100	68921000	20.2485	7.4290
351	123201	43243551	18.7350	7.0540	411	168921	69426531	20.2731	7.4350
352	123904	43614208	18.7617	7.0607	412	169744	69934528	20.2978	7.4410
353	124609	43986977	18.7883	7.0674	413	170569	70444997	20.3224	7.4470
354	125316	44361864	18.8149	7.0740	414	171396	70957944	20.3470	7.4530
355	126025	44738875	18.8414	7.0807	415	172225	71473375	20.3715	7.4590
356	126736	45118016	18.8680	7.0873	416	173056	71991296	20.3961	7.4650
357	127449	45499293	18.8944	7.0940	417	173889	72511713	20.4206	7.4710
358	128164	45882712	18.9209	7.1006	418	174724	73034632	20.4450	7.4770
359	128881	46268279	18.9473	7.1072	419	175561	73560059	20.4695	7.4829
360	129600	46656000	18.9737	7.1138	420	176400	74088000	20.4939	7.4889
N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$

N	N²	N³	√N	∛N
420	176400	74088000	20.4939	7.4889
421	177241	74618461	20.5183	7.4948
422	178084	75151448	20.5426	7.5007
423	178929	75686967	20.5670	7.5067
424	179776	76225024	20.5913	7.5126
425	180625	76765625	20.6155	7.5185
426	181476	77308776	20.6398	7.5244
427	182329	77854483	20.6640	7.5302
428	183184	78402752	20.6882	7.5361
429	184041	78953589	20.7123	7.5420
430	184900	79507000	20.7364	7.5478
431	185761	80062991	20.7605	7.5537
432	186624	80621568	20.7846	7.5595
433	187489	81182737	20.8087	7.5654
434	188356	81746504	20.8327	7.5712
435	189225	82312875	20.8567	7.5770
436	190096	82881856	20.8806	7.5828
437	190969	83453453	20.9045	7.5886
438	191844	84027672	20.9284	7.5944
439	192721	84604519	20.9523	7.6001
440	193600	85184000	20.9762	7.6059
441	194481	85766121	21.0000	7.6117
442	195364	86350888	21.0238	7.6174
443	196249	86938307	21.0476	7.6232
444	197136	87528384	21.0713	7.6289
445	198025	88121125	21.0950	7.6346
446	198916	88716536	21.1187	7.6403
447	199809	89314623	21.1424	7.6460
448	200704	89915392	21.1660	7.6517
449	201601	90518849	21.1896	7.6574
450	202500	91125000	21.2132	7.6631
451	203401	91733851	21.2368	7.6688
452	204304	92345408	21.2603	7.6744
453	205209	92959677	21.2838	7.6801
454	206116	93576664	21.3073	7.6857
455	207025	94196375	21.3307	7.6914
456	207936	94818816	21.3542	7.6970
457	208849	95443993	21.3776	7.7026
458	209764	96071912	21.4009	7.7082
459	210681	96702579	21.4243	7.7138
460	211600	97336000	21.4476	7.7194
461	212521	97972181	21.4709	7.7250
462	213444	98611128	21.4942	7.7306
463	214369	99252847	21.5174	7.7362
464	215296	99897344	21.5407	7.7418
465	216225	100544625	21.5639	7.7473
466	217156	101194696	21.5870	7.7529
467	218089	101847563	21.6102	7.7584
468	219024	102503232	21.6333	7.7639
469	219961	103161709	21.6564	7.7695
470	220900	103823000	21.6795	7.7750
471	221841	104487111	21.7025	7.7805
472	222784	105154048	21.7256	7.7860
473	223729	105823817	21.7486	7.7915
474	224676	106496424	21.7715	7.7970
475	225625	107171875	21.7945	7.8025
476	226576	107850176	21.8174	7.8079
477	227529	108531333	21.8403	7.8134
478	228484	109215352	21.8632	7.8188
479	229441	109902239	21.8861	7.8243
480	230400	110592000	21.9089	7.8297

N	N²	N³	√N	∛N
480	230400	110592000	21.9089	7.8297
481	231361	111284641	21.9317	7.8352
482	232324	111980168	21.9545	7.8406
483	233289	112678587	21.9773	7.8460
484	234256	113379904	22.0000	7.8514
485	235225	114084125	22.0227	7.8568
486	236196	114791256	22.0454	7.8622
487	237169	115501303	22.0681	7.8676
488	238144	116214272	22.0907	7.8730
489	239121	116930169	22.1133	7.8784
490	240100	117649000	22.1359	7.8837
491	241081	118370771	22.1585	7.8891
492	242064	119095488	22.1811	7.8944
493	243049	119823157	22.2036	7.8998
494	244036	120553784	22.2261	7.9051
495	245025	121287375	22.2486	7.9105
496	246016	122023936	22.2711	7.9158
497	247009	122763473	22.2935	7.9211
498	248004	123505992	22.3159	7.9264
499	249001	124251499	22.3383	7.9317
500	250000	125000000	22.3607	7.9370
501	251001	125751501	22.3830	7.9423
502	252004	126506008	22.4054	7.9476
503	253009	127263527	22.4277	7.9528
504	254016	128024064	22.4499	7.9581
505	255025	128787625	22.4722	7.9634
506	256036	129554216	22.4944	7.9686
507	257049	130323843	22.5167	7.9739
508	258064	131096512	22.5389	7.9791
509	259081	131872229	22.5610	7.9843
510	260100	132651000	22.5832	7.9896
511	261121	133432831	22.6053	7.9948
512	262144	134217728	22.6274	8.0000
513	263169	135005697	22.6495	8.0052
514	264196	135796744	22.6716	8.0104
515	265225	136590875	22.6936	8.0156
516	266256	137388096	22.7156	8.0208
517	267289	138188413	22.7376	8.0260
518	268324	138991832	22.7596	8.0311
519	269361	139798359	22.7816	8.0363
520	270400	140608000	22.8035	8.0415
521	271441	141420761	22.8254	8.0466
522	272484	142236648	22.8473	8.0517
523	273529	143055667	22.8692	8.0569
524	274576	143877824	22.8910	8.0620
525	275625	144703125	22.9129	8.0671
526	276676	145531576	22.9347	8.0723
527	277729	146363183	22.9565	8.0774
528	278784	147197952	22.9783	8.0825
529	279841	148035889	23.0000	8.0876
530	280900	148877000	23.0217	8.0927
531	281961	149721291	23.0434	8.0978
532	283024	150568768	23.0651	8.1028
533	284089	151419437	23.0868	8.1079
534	285156	152273304	23.1084	8.1130
535	286225	153130375	23.1301	8.1180
536	287296	153990656	23.1517	8.1231
537	288369	154854153	23.1733	8.1281
538	289444	155720872	23.1948	8.1332
539	290521	156590819	23.2164	8.1382
540	291600	157464000	23.2379	8.1433

N	N²	N³	√N	∛N

N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$
540	291600	157464000	23.2379	8.1433	600	360000	216000000	24.4949	8.4343
541	292681	158340421	23.2594	8.1483	601	361201	217081801	24.5153	8.4390
542	293764	159220088	23.2809	8.1533	602	362404	218167208	24.5357	8.4437
543	294849	160103007	23.3024	8.1583	603	363609	219256227	24.5561	8.4484
544	295936	160989184	23.3238	8.1633	604	364816	220348864	24.5764	8.4530
545	297025	161878625	23.3452	8.1683	605	366025	221445125	24.5967	8.4577
546	298116	162771336	23.3666	8.1733	606	367236	222545016	24.6171	8.4623
547	299209	163667323	23.3880	8.1783	607	368449	223648543	24.6374	8.4670
548	300304	164566592	23.4094	8.1833	608	369664	224755712	24.6577	8.4716
549	301401	165469149	23.4307	8.1882	609	370881	225866529	24.6779	8.4763
550	302500	166375000	23.4521	8.1932	610	372100	226981000	24.6982	8.4809
551	303601	167284151	23.4734	8.1982	611	373321	228099131	24.7184	8.4856
552	304704	168196608	23.4947	8.2031	612	374544	229220928	24.7386	8.4902
553	305809	169112377	23.5160	8.2081	613	375769	230346397	24.7588	8.4948
554	306916	170031464	23.5372	8.2130	614	376996	231475544	24.7790	8.4994
555	308025	170953875	23.5584	8.2180	615	378225	232608375	24.7992	8.5040
556	309136	171879616	23.5797	8.2229	616	379456	233744896	24.8193	8.5086
557	310249	172808693	23.6008	8.2278	617	380689	234885113	24.8395	8.5132
558	311364	173741112	23.6220	8.2327	618	381924	236029032	24.8596	8.5178
559	312481	174676879	23.6432	8.2377	619	383161	237176659	24.8797	8.5224
560	313600	175616000	23.6643	8.2426	620	384400	238328000	24.8998	8.5270
561	314721	176558481	23.6854	8.2475	621	385641	239483061	24.9199	8.5316
562	315844	177504328	23.7065	8.2524	622	386884	240641848	24.9399	8.5362
563	316969	178453547	23.7276	8.2573	623	388129	241804367	24.9600	8.5408
564	318096	179406144	23.7487	8.2621	624	389376	242970624	24.9800	8.5453
565	319225	180362125	23.7697	8.2670	625	390625	244140625	25.0000	8.5499
566	320356	181321496	23.7908	8.2719	626	391876	245314376	25.0200	8.5544
567	321489	182284263	23.8118	8.2768	627	393129	246491883	25.0400	8.5590
568	322624	183250432	23.8328	8.2816	628	394384	247673152	25.0599	8.5635
569	323761	184220009	23.8537	8.2865	629	395641	248858189	25.0799	8.5681
570	324900	185193000	23.8747	8.2913	630	396900	250047000	25.0998	8.5726
571	326041	186169411	23.8956	8.2962	631	398161	251239591	25.1197	8.5772
572	327184	187149248	23.9165	8.3010	632	399424	252435968	25.1396	8.5817
573	328329	188132517	23.9374	8.3059	633	400689	253636137	25.1595	8.5862
574	329476	189119224	23.9583	8.3107	634	401956	254840104	25.1794	8.5907
575	330625	190109375	23.9792	8.3155	635	403225	256047875	25.1992	8.5952
576	331776	191102976	24.0000	8.3203	636	404496	257259456	25.2190	8.5997
577	332929	192100033	24.0208	8.3251	637	405769	258474853	25.2389	8.6043
578	334084	193100552	24.0416	8.3300	638	407044	259694072	25.2587	8.6088
579	335241	194104539	24.0624	8.3348	639	408321	260917119	25.2784	8.6132
580	336400	195112000	24.0832	8.3396	640	409600	262144000	25.2982	8.6177
581	337561	196122941	24.1039	8.3443	641	410881	263374721	25.3180	8.6222
582	338724	197137368	24.1247	8.3491	642	412164	264609288	25.3377	8.6267
583	339889	198155287	24.1454	8.3539	643	413449	265847707	25.3574	8.6312
584	341056	199176704	24.1661	8.3587	644	414736	267089984	25.3772	8.6357
585	342225	200201625	24.1868	8.3634	645	416025	268336125	25.3969	8.6401
586	343396	201230056	24.2074	8.3682	646	417316	269586136	25.4165	8.6446
587	344569	202262003	24.2281	8.3730	647	418609	270840023	25.4362	8.6490
588	345744	203297472	24.2487	8.3777	648	419904	272097792	25.4558	8.6535
589	346921	204336469	24.2693	8.3825	649	421201	273359449	25.4755	8.6579
590	348100	205379000	24.2899	8.3872	650	422500	274625000	25.4951	8.6624
591	349281	206425071	24.3105	8.3919	651	423801	275894451	25.5147	8.6668
592	350464	207474688	24.3311	8.3967	652	425104	277167808	25.5343	8.6713
593	351649	208527857	24.3516	8.4014	653	426409	278445077	25.5539	8.6757
594	352836	209584584	24.3721	8.4061	654	427716	279726264	25.5734	8.6801
595	354025	210644875	24.3926	8.4108	655	429025	281011375	25.5930	8.6845
596	355216	211708736	24.4131	8.4155	656	430336	282300416	25.6125	8.6890
597	356409	212776173	24.4336	8.4202	657	431649	283593393	25.6320	8.6934
598	357604	213847192	24.4540	8.4249	658	432964	284890312	25.6515	8.6978
599	358801	214921799	24.4745	8.4296	659	434281	286191179	25.6710	8.7022
600	360000	216000000	24.4949	8.4343	660	435600	287496000	25.6905	8.7066
N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$	N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$

N	N²	N³	√N	∛N	N	N²	N³	√N	∛N
660	435600	287496000	25.6905	8.7066	720	518400	373248000	26.8328	8.9628
661	436921	288804781	25.7099	8.7110	721	519841	374805361	26.8514	8.9670
662	438244	290117528	25.7294	8.7154	722	521284	376367048	26.8701	8.9711
663	439569	291434247	25.7488	8.7198	723	522729	377933067	26.8887	8.9752
664	440896	292754944	25.7682	8.7241	724	524176	379503424	26.9072	8.9794
665	442225	294079625	25.7876	8.7285	725	525625	381078125	26.9258	8.9835
666	443556	295408296	25.8070	8.7329	726	527076	382657176	26.9444	8.9876
667	444889	296740963	25.8263	8.7373	727	528529	384240583	26.9629	8.9918
668	446224	298077632	25.8457	8.7416	728	529984	385828352	26.9815	8.9959
669	447561	299418309	25.8650	8.7460	729	531441	387420489	27.0000	9.0000
670	448900	300763000	25.8844	8.7503	730	532900	389017000	27.0185	9.0041
671	450241	302111711	25.9037	8.7547	731	534361	390617891	27.0370	9.0082
672	451584	303464448	25.9230	8.7590	732	535824	392223168	27.0555	9.0123
673	452929	304821217	25.9422	8.7634	733	537289	393832837	27.0740	9.0164
674	454276	306182024	25.9615	8.7677	734	538756	395446904	27.0924	9.0205
675	455625	307546875	25.9808	8.7721	735	540225	397065375	27.1109	9.0246
676	456976	308915776	26.0000	8.7764	736	541696	398688256	27.1293	9.0287
677	458329	310288733	26.0192	8.7807	737	543169	400315553	27.1477	9.0328
678	459684	311665752	26.0384	8.7850	738	544644	401947272	27.1662	9.0369
679	461041	313046839	26.0576	8.7893	739	546121	403583419	27.1846	9.0410
680	462400	314432000	26.0768	8.7937	740	547600	405224000	27.2029	9.0450
681	463761	315821241	26.0960	8.7980	741	549081	406869021	27.2213	9.0491
682	465124	317214568	26.1151	8.8023	742	550564	408518488	27.2397	9.0532
683	466489	318611987	26.1343	8.8066	743	552049	410172407	27.2580	9.0572
684	467856	320013504	26.1534	8.8109	744	553536	411830784	27.2764	9.0613
685	469225	321419125	26.1725	8.8152	745	555025	413493625	27.2947	9.0654
686	470596	322828856	26.1916	8.8194	746	556516	415160936	27.3130	9.0694
687	471969	324242703	26.2107	8.8237	747	558009	416832723	27.3313	9.0735
688	473344	325660672	26.2298	8.8280	748	559504	418508992	27.3496	9.0775
689	474721	327082769	26.2488	8.8323	749	561001	420189749	27.3679	9.0816
690	476100	328509000	26.2679	8.8366	750	562500	421875000	27.3861	9.0856
691	477481	329939371	26.2869	8.8408	751	564001	423564751	27.4044	9.0896
692	478864	331373888	26.3059	8.8451	752	565504	425259008	27.4226	9.0937
693	480249	332812557	26.3249	8.8493	753	567009	426957777	27.4408	9.0977
694	481636	334255384	26.3439	8.8536	754	568516	428661064	27.4591	9.1017
695	483025	335702375	26.3629	8.8578	755	570025	430368875	27.4773	9.1057
696	484416	337153536	26.3818	8.8621	756	571536	432081216	27.4955	9.1098
697	485809	338608873	26.4008	8.8663	757	573049	433798093	27.5136	9.1138
698	487204	340068392	26.4197	8.8706	758	574564	435519512	27.5318	9.1178
699	488601	341532099	26.4386	8.8748	759	576081	437245479	27.5500	9.1218
700	490000	343000000	26.4575	8.8790	760	577600	438976000	27.5681	9.1258
701	491401	344472101	26.4764	8.8833	761	579121	440711081	27.5862	9.1298
702	492804	345948408	26.4953	8.8875	762	580644	442450728	27.6043	9.1338
703	494209	347428927	26.5141	8.8917	763	582169	444194947	27.6225	9.1378
704	495616	348913664	26.5330	8.8959	764	583696	445943744	27.6405	9.1418
705	497025	350402625	26.5518	8.9001	765	585225	447697125	27.6586	9.1458
706	498436	351895816	26.5707	8.9043	766	586756	449455096	27.6767	9.1498
707	499849	353393243	26.5895	8.9085	767	588289	451217663	27.6948	9.1537
708	501264	354894912	26.6083	8.9127	768	589824	452984832	27.7128	9.1577
709	502681	356400829	26.6271	8.9169	769	591361	454756609	27.7308	9.1617
710	504100	357911000	26.6458	8.9211	770	592900	456533000	27.7489	9.1657
711	505521	359425431	26.6646	8.9253	771	594441	458314011	27.7669	9.1696
712	506944	360944128	26.6833	8.9295	772	595984	460099648	27.7849	9.1736
713	508369	362467097	26.7021	8.9337	773	597529	461889917	27.8029	9.1775
714	509796	363994344	26.7208	8.9378	774	599076	463684824	27.8209	9.1815
715	511225	365525875	26.7395	8.9420	775	600625	465484375	27.8388	9.1855
716	512656	367061696	26.7582	8.9462	776	602176	467288576	27.8568	9.1894
717	514089	368601813	26.7769	8.9503	777	603729	469097433	27.8747	9.1933
718	515524	370146232	26.7955	8.9545	778	605284	470910952	27.8927	9.1973
719	516961	371694959	26.8142	8.9587	779	606841	472729139	27.9106	9.2012
720	518400	373248000	26.8328	8.9628	780	608400	474552000	27.9285	9.2052
N	N²	N³	√N	∛N	N	N²	N³	√N	∛N

N	N²	N³	√N	∛N
780	608400	474552000	27.9285	9.2052
781	609961	476379541	27.9464	9.2091
782	611524	478211768	27.9643	9.2130
783	613089	480048687	27.9821	9.2170
784	614656	481890304	28.0000	9.2209
785	616225	483736625	28.0179	9.2248
786	617796	485587656	28.0357	9.2287
787	619369	487443403	28.0535	9.2326
788	620944	489303872	28.0713	9.2365
789	622521	491169069	28.0891	9.2404
790	624100	493039000	28.1069	9.2443
791	625681	494913671	28.1247	9.2482
792	627264	496793088	28.1425	9.2521
793	628849	498677257	28.1603	9.2560
794	630436	500566184	28.1780	9.2599
795	632025	502459875	28.1957	9.2638
796	633616	504358336	28.2135	9.2677
797	635209	506261573	28.2312	9.2716
798	636804	508169592	28.2489	9.2754
799	638401	510082399	28.2666	9.2793
800	640000	512000000	28.2843	9.2832
801	641601	513922401	28.3019	9.2870
802	643204	515849608	28.3196	9.2909
803	644809	517781627	28.3373	9.2948
804	646416	519718464	28.3549	9.2986
805	648025	521660125	28.3725	9.3025
806	649636	523606616	28.3901	9.3063
807	651249	525557943	28.4077	9.3102
808	652864	527514112	28.4253	9.3140
809	654481	529475129	28.4429	9.3179
810	656100	531441000	28.4605	9.3217
811	657721	533411731	28.4781	9.3255
812	659344	535387328	28.4956	9.3294
813	660969	537367797	28.5132	9.3332
814	662596	539353144	28.5307	9.3370
815	664225	541343375	28.5482	9.3408
816	665856	543338496	28.5657	9.3447
817	667489	545338513	28.5832	9.3485
818	669124	547343432	28.6007	9.3523
819	670761	549353259	28.6182	9.3561
820	672400	551368000	28.6356	9.3599
821	674041	553387661	28.6531	9.3637
822	675684	555412248	28.6705	9.3675
823	677329	557441767	28.6880	9.3713
824	678976	559476224	28.7054	9.3751
825	680625	561515625	28.7228	9.3789
826	682276	563559976	28.7402	9.3827
827	683929	565609283	28.7576	9.3865
828	685584	567663552	28.7750	9.3902
829	687241	569722789	28.7924	9.3940
830	688900	571787000	28.8097	9.3978
831	690561	573856191	28.8271	9.4016
832	692224	575930368	28.8444	9.4053
833	693889	578009537	28.8617	9.4091
834	695556	580093704	28.8791	9.4129
835	697225	582182875	28.8964	9.4166
836	698896	584277056	28.9137	9.4204
837	700569	586376253	28.9310	9.4241
838	702244	588480472	28.9482	9.4279
839	703921	590589719	28.9655	9.4316
840	705600	592704000	28.9828	9.4354

N	N²	N³	√N	∛N
840	705600	592704000	28.9828	9.4354
841	707281	594823321	29.0000	9.4391
842	708964	596947688	29.0172	9.4429
843	710649	599077107	29.0345	9.4466
844	712336	601211584	29.0517	9.4503
845	714025	603351125	29.0689	9.4541
846	715716	605495736	29.0861	9.4578
847	717409	607645423	29.1033	9.4615
848	719104	609800192	29.1204	9.4652
849	720801	611960049	29.1376	9.4690
850	722500	614125000	29.1548	9.4727
851	724201	616295051	29.1719	9.4764
852	725904	618470208	29.1890	9.4801
853	727609	620650477	29.2062	9.4838
854	729316	622835864	29.2233	9.4875
855	731025	625026375	29.2404	9.4912
856	732736	627222016	29.2575	9.4949
857	734449	629422793	29.2746	9.4986
858	736164	631628712	29.2916	9.5023
859	737881	633839779	29.3087	9.5060
860	739600	636056000	29.3258	9.5097
861	741321	638277381	29.3428	9.5134
862	743044	640503928	29.3598	9.5171
863	744769	642735647	29.3769	9.5207
864	746496	644972544	29.3939	9.5244
865	748225	647214625	29.4109	9.5281
866	749956	649461896	29.4279	9.5317
867	751689	651714363	29.4449	9.5354
868	753424	653972032	29.4618	9.5391
869	755161	656234909	29.4788	9.5427
870	756900	658503000	29.4958	9.5464
871	758641	660776311	29.5127	9.5501
872	760384	663054848	29.5296	9.5537
873	762129	665338617	29.5466	9.5574
874	763876	667627624	29.5635	9.5610
875	765625	669921875	29.5804	9.5647
876	767376	672221376	29.5973	9.5683
877	769129	674526133	29.6142	9.5719
878	770884	676836152	29.6311	9.5756
879	772641	679151439	29.6479	9.5792
880	774400	681472000	29.6648	9.5828
881	776161	683797841	29.6816	9.5865
882	777924	686128968	29.6985	9.5901
883	779689	688465387	29.7153	9.5937
884	781456	690807104	29.7321	9.5973
885	783225	693154125	29.7489	9.6010
886	784996	695506456	29.7658	9.6046
887	786769	697864103	29.7825	9.6082
888	788544	700227072	29.7993	9.6118
889	790321	702595369	29.8161	9.6154
890	792100	704969000	29.8329	9.6190
891	793881	707347971	29.8496	9.6226
892	795664	709732288	29.8664	9.6262
893	797449	712121957	29.8831	9.6298
894	799236	714516984	29.8998	9.6334
895	801025	716917375	29.9166	9.6370
896	802816	719323136	29.9333	9.6406
897	804609	721734273	29.9500	9.6442
898	806404	724150792	29.9666	9.6477
899	808201	726572699	29.9833	9.6513
900	810000	729000000	30.0000	9.6549

N	N²	N³	√N	∛N

900—1020

N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$
900	810000	729000000	30.0000	9.6549
901	811801	731432701	30.0167	9.6585
902	813604	733870808	30.0333	9.6620
903	815409	736314327	30.0500	9.6656
904	817216	738763264	30.0666	9.6692
905	819025	741217625	30.0832	9.6727
906	820836	743677416	30.0998	9.6763
907	822649	746142643	30.1164	9.6799
908	824464	748613312	30.1330	9.6834
909	826281	751089429	30.1496	9.6870
910	828100	753571000	30.1662	9.6905
911	829921	756058031	30.1828	9.6941
912	831744	758550528	30.1993	9.6976
913	833569	761048497	30.2159	9.7012
914	835396	763551944	30.2324	9.7047
915	837225	766060875	30.2490	9.7082
916	839056	768575296	30.2655	9.7118
917	840889	771095213	30.2820	9.7153
918	842724	773620632	30.2985	9.7188
919	844561	776151559	30.3150	9.7224
920	846400	778688000	30.3315	9.7259
921	848241	781229961	30.3480	9.7294
922	850084	783777448	30.3645	9.7329
923	851929	786330467	30.3809	9.7364
924	853776	788889024	30.3974	9.7400
925	855625	791453125	30.4138	9.7435
926	857476	794022776	30.4302	9.7470
927	859329	796597983	30.4467	9.7505
928	861184	799178752	30.4631	9.7540
929	863041	801765089	30.4795	9.7575
930	864900	804357000	30.4959	9.7610
931	866761	806954491	30.5123	9.7645
932	868624	809557568	30.5287	9.7680
933	870489	812166237	30.5450	9.7715
934	872356	814780504	30.5614	9.7750
935	874225	817400375	30.5778	9.7785
936	876096	820025856	30.5941	9.7819
937	877969	822656953	30.6105	9.7854
938	879844	825293672	30.6268	9.7889
939	881721	827936019	30.6431	9.7924
940	883600	830584000	30.6594	9.7959
941	885481	833237621	30.6757	9.7993
942	887364	835896888	30.6920	9.8028
943	889249	838561807	30.7083	9.8063
944	891136	841232384	30.7246	9.8097
945	893025	843908625	30.7409	9.8132
946	894916	846590536	30.7571	9.8167
947	896809	849278123	30.7734	9.8201
948	898704	851971392	30.7896	9.8236
949	900601	854670349	30.8058	9.8270
950	902500	857375000	30.8221	9.8305
951	904401	860085351	30.8383	9.8339
952	906304	862801408	30.8545	9.8374
953	908209	865523177	30.8707	9.8408
954	910116	868250664	30.8869	9.8443
955	912025	870983875	30.9031	9.8477
956	913936	873722816	30.9192	9.8511
957	915849	876467493	30.9354	9.8546
958	917764	879217912	30.9516	9.8580
959	919681	881974079	30.9677	9.8614
960	921600	884736000	30.9839	9.8648
N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$

N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$
960	921600	884736000	30.9839	9.8648
961	923521	887503681	31.0000	9.8683
962	925444	890277128	31.0161	9.8717
963	927369	893056347	31.0322	9.8751
964	929296	895841344	31.0483	9.8785
965	931225	898632125	31.0644	9.8819
966	933156	901428696	31.0805	9.8854
967	935089	904231063	31.0966	9.8888
968	937024	907039232	31.1127	9.8922
969	938961	909853209	31.1288	9.8956
970	940900	912673000	31.1448	9.8990
971	942841	915498611	31.1609	9.9024
972	944784	918330048	31.1769	9.9058
973	946729	921167317	31.1929	9.9092
974	948676	924010424	31.2090	9.9126
975	950625	926859375	31.2250	9.9160
976	952576	929714176	31.2410	9.9194
977	954529	932574833	31.2570	9.9227
978	956484	935441352	31.2730	9.9261
979	958441	938313739	31.2890	9.9295
980	960400	941192000	31.3050	9.9329
981	962361	944076141	31.3209	9.9363
982	964324	946966168	31.3369	9.9396
983	966289	949862087	31.3528	9.9430
984	968256	952763904	31.3688	9.9464
985	970225	955671625	31.3847	9.9497
986	972196	958585256	31.4006	9.9531
987	974169	961504803	31.4166	9.9565
988	976144	964430272	31.4325	9.9598
989	978121	967361669	31.4484	9.9632
990	980100	970299000	31.4643	9.9666
991	982081	973242271	31.4802	9.9699
992	984064	976191488	31.4960	9.9733
993	986049	979146657	31.5119	9.9766
994	988036	982107784	31.5278	9.9800
995	990025	985074875	31.5436	9.9833
996	992016	988047936	31.5595	9.9866
997	994009	991026973	31.5753	9.9900
998	996004	994011992	31.5911	9.9933
999	998001	997002999	31.6070	9.9967
1000	1000000	1000000000	31.6228	10.0000
1001	1002001	1003003001	31.6386	10.0033
1002	1004004	1006012008	31.6544	10.0067
1003	1006009	1009027027	31.6702	10.0100
1004	1008016	1012048064	31.6860	10.0133
1005	1010025	1015075125	31.7017	10.0166
1006	1012036	1018108216	31.7175	10.0200
1007	1014049	1021147343	31.7333	10.0233
1008	1016064	1024192512	31.7490	10.0266
1009	1018081	1027243729	31.7648	10.0299
1010	1020100	1030301000	31.7805	10.0332
1011	1022121	1033364331	31.7962	10.0365
1012	1024144	1036433728	31.8119	10.0398
1013	1026169	1039509197	31.8277	10.0431
1014	1028196	1042590744	31.8434	10.0465
1015	1030225	1045678375	31.8591	10.0498
1016	1032256	1048772096	31.8748	10.0531
1017	1034289	1051871913	31.8904	10.0563
1018	1036324	1054977832	31.9061	10.0596
1019	1038361	1058089859	31.9218	10.0629
1020	1040400	1061208000	31.0374	10.0662
N	N^2	N^3	$\sqrt{N}$	$\sqrt[3]{N}$

VII

TABLE OF FACTORS

FOR

COMPUTING PROBABLE ERRORS.

n	$\frac{.6745}{\sqrt{n(n-1)}}$	$\log\frac{.6745}{\sqrt{n(n-1)}}$	$\frac{.6745}{\sqrt{n-1}}$	$\log\frac{.6745}{\sqrt{n-1}}$
2	0.4769	9.67846	0.6745	9.82898
3	0.2754	9.43990	0.4769	9.67846
4	0.1947	9.28938	0.3894	9.59041
5	0.1508	9.17846	0.3372	9.52795
6	0.1231	9.09041	0.3016	9.47949
7	0.1041	9.01735	0.2754	9.43990
8	0.0901	8.95488	0.2549	9.40643
9	0.0795	8.90031	0.2385	9.37743
10	0.0711	8.85185	0.2248	9.35185
11	0.0643	8.80828	0.2133	9.32898
12	0.0587	8.76869	0.2029	9.30828
13	0.0540	8.73241	0.1947	9.28938
14	0.0500	8.69894	0.1871	9.27200
15	0.0465	8.66787	0.1803	9.25591
16	0.0435	8.63887	0.1742	9.24093
17	0.0409	8.61169	0.1686	9.22692
18	0.0386	8.58611	0.1636	9.21375
19	0.0365	8.56196	0.1590	9.20134
20	0.0346	8.53908	0.1547	9.18960
21	0.0329	8.51735	0.1508	9.17846
22	0.0314	8.49665	0.1472	9.16787
23	0.0300	8.47690	0.1438	9.15776
24	0.0287	8.45801	0.1406	9.14811
25	0.0275	8.43990	0.1377	9.13887
26	0.0265	8.42252	0.1349	9.13001
27	0.0255	8.40581	0.1323	9.12149
28	0 0245	8.38971	0.1298	9.11329
29	0.0237	8.37420	0.1275	9.10540
30	0.0229	8.35922	0.1252	9.09778
31	0.0221	8.34473	0.1231	9.09041
32	0.0214	8.33072	0.1211	9.08329
33	0.0208	8.31714	0.1192	9.07640
34	0.0201	8.30398	0.1174	9.06972
35	0.0196	8.29120	0.1157	9.06324
36	0.0190	8.27879	0.1140	9.05694
37	0.0185	8.26672	0.1124	9.05082
38	0.0180	8.25498	0.1109	9.04487
39	0.0175	8.24355	0.1094	9.03908
40	0.0171	8.23241	0.1080	9.03344

n	$\frac{.6745}{\sqrt{n(n-1)}}$	$\log\frac{.6745}{\sqrt{n(n-1)}}$	$\frac{.6745}{\sqrt{n-1}}$	$\log\frac{.6745}{\sqrt{n-1}}$
40	0.0171	8.23241	0.1080	9.03344
41	0.0167	8.22155	0.1066	9.02795
42	0.0163	8.21096	0 1053	9.02258
43	0.0159	8.20062	0.1041	9.01735
44	0.0155	8.19051	0.1029	9.01224
45	0.0152	8.18064	0.1017	9.00725
46	0.0148	8.17099	0.1005	9.00237
47	0.0145	8.16155	0.0994	8.99760
48	0.0142	8.15231	0.0984	8.99283
49	0.0139	8.14326	0.0974	8.98835
50	0.0136	8.13439	0.0964	8.98388
51	0.0134	8.12571	0.0954	8.97949
52	0.0131	8.11719	0.0944	8.97519
53	0.0128	8.10884	0.0935	8.97097
54	0.0126	8.10064	0.0926	8.96684
55	0.0124	8.09260	0.0918	8.96278
56	0.0122	8.08470	0.0900	8.95879
57	0.0119	8.07694	0.0901	8.95488
58	0.0117	8.06932	0.0893	8.95104
59	0.0115	8.06184	0.0886	8.94726
60	0.0113	8.05447	0.0878	8.94355
61	0.0111	8.04723	0.0871	8.93990
62	0.0110	8.04011	0.0864	8.93631
63	0.0108	8.03311	0.0857	8.93278
64	0.0106	8.02622	0.0850	8.92931
65	0.0105	8.01943	0.0843	8.92589
66	0.0103	8.01275	0.0837	8.92252
67	0.0101	8.00617	0.0830	8.91920
68	0.0100	7.99968	0.0824	8.91594
69	0.0098	7.99330	0.0818	8.91272
70	0.0097	7.98700	0.0812	8.90955
71	0.0096	7.98080	0.0806	8.90643
72	0.0094	7.97468	0.0800	8.90335
73	0.0093	7.96865	0.0795	8.90031
74	0.0092	7.96270	0.0789	8.89731
75	0.0091	7.95683	0.0784	8.89436
76	0.0089	7.95104	0.0779	8.89144
77	0.0088	7.94532	0.0774	8.88857
78	0.0087	7.93968	0.0769	8.88573
79	0.0086	7.93411	0.0764	8.88293
80	0.0085	7.92962	0.0759	8.88016

FORMULAS.

GENERAL TRIGONOMETRIC FORMULAS.

(1) $\sin^2 a + \cos^2 a = 1.$

(2) $\sin(a \pm \beta) = \sin a \cos \beta \pm \cos a \sin \beta.$

(3) $\cos(a \pm \beta) = \cos a \cos \beta \mp \sin a \sin \beta.$

(4) $$\tan(a \pm \beta) = \frac{\tan a \pm \tan \beta}{1 \mp \tan a \tan \beta}.$$

(5) $\sin 2a = 2 \sin a \cos a.$

(6) $\cos 2a = \cos^2 a - \sin^2 a = 1 - 2\sin^2 a = 2\cos^2 a - 1.$

(7) $$\tan 2a = \frac{2 \tan a}{1 - \tan^2 a}.$$

(8) $\sin^2 a = \frac{1}{2}(1 - \cos 2a).$

(9) $\cos^2 a = \frac{1}{2}(1 + \cos 2a).$

(10) $$\tan a = \frac{\sin 2a}{1 + \cos 2a}.$$

(11) $\sin a + \sin \beta = 2 \sin \frac{1}{2}(a + \beta) \cos \frac{1}{2}(a - \beta).$

(12) $\sin a - \sin \beta = 2 \cos \frac{1}{2}(a + \beta) \sin \frac{1}{2}(a - \beta).$

(13) $\cos a + \cos \beta = 2 \cos \frac{1}{2}(a + \beta) \cos \frac{1}{2}(a - \beta).$

(14) $\cos \beta - \cos a = 2 \sin \frac{1}{2}(a + \beta) \sin \frac{1}{2}(a - \beta).$

(15) $\sin^2 a - \sin^2 \beta = \cos^2 \beta - \cos^2 a = \sin(a + \beta) \sin(a - \beta).$

(16) $\cos^2 a - \sin^2 \beta = \cos(a + \beta) \cos(a - \beta).$

(17) $$\tan a \pm \tan \beta = \frac{\sin(a \pm \beta)}{\cos a \cos \beta}.$$

(18) $$\cot a \pm \cot \beta = \pm \frac{\sin(a \pm \beta)}{\sin a \sin \beta}.$$

(19) $$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \text{etc.}$$

(20) $$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \text{etc.}$$

FORMULAS FOR PLANE TRIANGLES.

In these formulas a, b and c denote the sides and A, B and C the opposite angles. K denotes the area and $s = \frac{1}{2}(a + b + c)$. Only one formula of each set is given, the other two may be obtained by advancing the letters.

(21) $$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}.$$

(22) $$\frac{a + b}{a - b} = \frac{\tan \frac{1}{2}(A + B)}{\tan \frac{1}{2}(A - B)}.$$

(23) $a^2 = b^2 + c^2 - 2bc \cos A.$

(24) $a = b \cos C + c \cos B.$

(25) $$\sin \tfrac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{bc}},$$

(26) $$\cos \tfrac{1}{2} A = \sqrt{\frac{s\,(s-a)}{b\,c}}.$$

(27) $$\tan \tfrac{1}{2} A = \sqrt{\frac{(s-b)\,(s-c)}{s\,(s-a)}}.$$

(28) $$K = \tfrac{1}{2}\, a\, b \sin C = \sqrt{s\,(s-a)(s-b)(s-c)}.$$

FORMULAS FOR RIGHT SPHERICAL TRIANGLES.

Denoting the right angle by C, the formulas are

(29) $$\sin a = \sin A \sin c.$$
(30) $$\sin b = \sin B \sin c.$$
(31) $$\tan a = \cos B \tan c = \tan A \sin b.$$
(32) $$\tan b = \cos A \tan c = \tan B \sin a.$$
(33) $$\cos A = \cos a \sin B.$$
(34) $$\cos B = \cos b \sin A.$$
(35) $$\cos c = \cos a \cos b.$$
(36) $$\cos c = \cot A \cot B.$$

FORMULAS FOR THE GENERAL SPHERICAL TRIANGLE.

$$\cos a = \cos b \cos c + \sin b \sin c \cos A.$$

(37) $$\sin a \sin B = \sin b \sin A.$$
(38) $$\sin a \cos B = \cos b \sin c - \sin b \cos c \cos A.$$
(39) $$\sin a \cos C = \cos c \sin b - \sin c \cos b \cos A.$$

(40) $$\sin A \cot B = \cot b \sin c - \cos c \cos A.$$
(41) $$\sin A \cot C = \cot c \sin b - \cos b \cos A.$$
(42) $$\sin A \cos b = \cos B \sin C + \sin B \cos C \cos a.$$
(43) $$\sin A \cos c = \cos C \sin B + \sin C \cos B \cos a.$$

(44) $$\sin a \cot b = \cot B \sin C + \cos C \cos a.$$
(45) $$\sin a \cot c = \cot C \sin B + \cos B \cos a.$$
(46) $$\cos A = \sin B \sin C \cos a - \cos B \cos C.$$

Putting $s = \tfrac{1}{2}(a+b+c)$ and $S = \tfrac{1}{2}(A+B+C)$,

(47) $$\sin \tfrac{1}{2} A = \pm \sqrt{\frac{\sin (s-b)\, \sin (s-c)}{\sin b \sin c}}.$$

(48) $$\cos \tfrac{1}{2} A = \pm \sqrt{\frac{\sin s \sin (s-a)}{\sin b \sin c}}.$$

(49) $$\tan \tfrac{1}{2} A = \pm \sqrt{\frac{\sin (s-b) \sin (s-c)}{\sin s \sin (s-a)}}.$$

(50) $$\sin \tfrac{1}{2} a = \pm \sqrt{\frac{-\cos S \cos (S-A)}{\sin B \sin C}}.$$

(51) $$\cos \tfrac{1}{2} a = \pm \sqrt{\frac{\cos (S-B) \cos (S-C)}{\sin B \sin C}}.$$

(52) $$\tan \tfrac{1}{2} a = \pm \sqrt{\frac{-\cos S \cos (S-A)}{\cos (S-B) \cos (S-C)}}.$$

(53) $$\sin \tfrac{1}{2} A \sin \tfrac{1}{2} (b+c) = \pm \sin \tfrac{1}{2} a \cos \tfrac{1}{2} (B-C).$$
(54) $$\sin \tfrac{1}{2} A \cos \tfrac{1}{2} (b+c) = \pm \cos \tfrac{1}{2} a \cos \tfrac{1}{2} (B+C).$$
(55) $$\cos \tfrac{1}{2} A \sin \tfrac{1}{2} (b-c) = \pm \sin \tfrac{1}{2} a \sin \tfrac{1}{2} (B-C).$$
(56) $$\cos \tfrac{1}{2} A \cos \tfrac{1}{2} (b-c) = \pm \cos \tfrac{1}{2} a \sin \tfrac{1}{2} (B+C).$$

(57) $$\tan^2 \tfrac{1}{4} K = \tan \tfrac{1}{2} s \tan \tfrac{1}{2} (s-a) \tan \tfrac{1}{2} (s-b) \tan \tfrac{1}{2} (s-c).$$

FORMULAS RESULTING FROM THE METHOD OF LEAST SQUARES.

Formulas for Combining Observations and Determining Probable Errors.

1. Direct observations of a quantity: n separate results, $m_1, m_2, \ldots m_n$ of equal weight.

Most probable value of quantity, $z = \frac{[m]}{n}$. *

Residuals, $z - m_1 = v_1$, $z - m_2 = v_2, \ldots z - m_n = v_n$.

Probable error of z, $r_0 = \pm 0.6745 \sqrt{\frac{[vv]}{n(n-1)}}$.

Probable error of a single observation, $r = \pm 0.6745 \sqrt{\frac{[vv]}{n-1}}$.

2. Direct observations of a quantity: n separate results, $m_1, m_2, \ldots m_n$ of unequal weights, $p_1, p_2, \ldots p_n$.

Most probable value of quantity, $z = \frac{[pm]}{[p]}$.

Probable error of z, $r_0 = \pm 0.6745 \sqrt{\frac{[pvv]}{[p](n-1)}}$.

Probable error of an obs'n of weight unity, $r = \pm 0.6745 \sqrt{\frac{[pvv]}{n-1}}$.

Weight of z, $P = [p]$.

Relation of weights to probable errors, $p_1 : p_2 : \ldots :: \frac{1}{r_1^2} : \frac{1}{r_2^2} : \ldots$

3. If $Z = az_1 \pm bz_2 \pm \ldots kz_n$, and the probable errors and weights of $z_1, z_2, \ldots z_n$ are $r_1, r_2, \ldots r_n$ and $p_1, p_2, \ldots p_n$, then the probable error and weight of Z are given by

$$r = \pm \sqrt{(ar_1)^2 + (br_2)^2 + \ldots (kr_n)^2}.$$

$$\frac{1}{p} = \frac{a^2}{p_1} + \frac{b^2}{p_2} + \ldots \frac{k^2}{p_n}.$$

4. In general, if $Z = f(z_1, z_2, \ldots z_n)$, the probable error of Z is

$$r = \pm \sqrt{\left(\frac{df}{dz_1}\right)^2 r_1^2 + \left(\frac{df}{dz_2}\right)^2 r_2^2 + \ldots + \left(\frac{df}{dz_n}\right)^2 r_n^2}.$$

5. Direct observations of a function of a quantity z: the separate results, $m_1, m_2, \ldots m_n$ of equal weight, and the form of the function, az. The observation equations are

$$\begin{aligned} a_1 z + m_1 &= 0, \\ a_2 z + m_2 &= 0, \\ &\ldots\ldots \\ a_n z + m_n &= 0. \end{aligned}$$

The most probable value of z and its probable error are

$$z = -\frac{[am]}{[aa]} \qquad r = \pm 0.6745 \sqrt{\frac{[vv]}{[aa]\ (n-1)}}.$$

If the observations are of unequal weights, multiply the observation equations through by the square roots of their respective weights, and proceed as before.

6. Direct observations of a function of two quantities, w and z: the separate

* The symbols [ ] signify the sum of all similar quantities. Thus,

$[m] \equiv m_1 + m_2 + \ldots + m_n$.

$[pvv] \equiv p_1 v_1^2 + p_2 v_2^2 + \ldots + p_n v_n^2$.

results, $m_1, m_2, \ldots m_n$ of equal weights, and the form of the function, $aw + bz$. The observation equations are

$$\begin{aligned} a_1 w + b_1 z + m_1 &= 0, \\ a_2 w + b_2 z + m_2 &= 0, \\ &\cdots \\ a_n w + b_n z + m_n &= 0. \end{aligned}$$

The normal equations are

$$\begin{aligned} [a\,a]w + [a\,b]z + [a\,m] &= 0, \\ [a\,b]w + [b\,b]z + [b\,m] &= 0. \end{aligned}$$

Let

$$[b\,b] - \frac{[a\,b]}{[a\,a]}[a\,b] = [b\,b.1], \qquad [b\,m] - \frac{[a\,b]}{[a\,a]}[a\,m] = [b\,m.1]$$

Then the most probable values of w and z are given by

$$z = -\frac{[bm.1]}{[bb.1]},$$

$$w = -\frac{[a\,b]}{[a\,a]}z - \frac{[a\,m]}{[a\,a]}.$$

The weights of w and z are

$$p_z = [bb.1], \qquad p_w = \frac{[bb.1]}{[b\,b]}[a\,a].$$

The probable error of a single observation (of weight unity) is

$$r = \pm 0.6745\sqrt{\frac{[v\,v]}{n-2}};$$

and the probable errors of w and z are

$$r_w = \frac{r}{\sqrt{p_w}}, \qquad r_z = \frac{r}{\sqrt{p}}.$$

If the observations are of unequal weights, multiply the observation equations through by the square roots of their respective weights and proceed as before.

7. Direct observations of a function of three quantities, x, y and z: the separate results. $m_1, m_2, \ldots m_n$ of equal weight, and the form of the function, $ax + by + cz$. The observation equations are

$$\begin{aligned} a_1 x + b_1 y + c_1 z + m_1 &= 0, \\ a_2 x + b_2 y + c_2 z + m_2 &= 0, \\ &\cdots \\ a_n x + b_n y + c_n z + m_n &= 0. \end{aligned}$$

The normal equations are

$$\begin{aligned} [a\,a]x + [a\,b]y + [a\,c]z + [a\,m] &= 0, \\ [a\,b]x + [b\,b]y + [b\,c]z + [b\,m] &= 0, \\ [a\,c]x + [b\,c]y + [c\,c]z + [c\,m] &= 0. \end{aligned}$$

Let

$$[b\,b] - \frac{[a\,b]}{[a\,a]}[a\,b] = [bb.1], \quad [b\,c] - \frac{[a\,b]}{[a\,a]}[a\,c] = [bc.1],$$

$$[b\,m] - \frac{[a\,b]}{[a\,a]}[a\,m] = [b\,m.1],$$

$$[c\,c] - \frac{[a\,c]}{[a\,a]}[a\,c] = [c\,c.1], \quad [c\,m] - \frac{[a\,c]}{[a\,a]}[a\,m] = [c\,m.1],$$

$$[cc.1] - \frac{[b\,c.1]}{[bb.1]}[b\,c.1] = [c\,c.2], \quad [cm.1] - \frac{[bc.1]}{[bb.1]}[bm.1] = [c\,m.2].$$

Then the most probable values of x, y and z are given by

$$z = -\frac{[c\,m.2]}{[c\,c.2]},$$

$$y = -\frac{[b\,c.1]}{[b\,b.1]}\,z - \frac{[b\,m.1]}{[b\,b.1]},$$

$$x = -\frac{[a\,b]}{[a\,a]}\,y - \frac{[a\,c]}{[a\,a]}\,z - \frac{[a\,m]}{[a\,a]}.$$

The weights of x, y and z are given by

$$p_z = [c\,c.2],$$

$$p_y = \frac{[c\,c.2]}{[c\,c.1]}[b\,b.1],$$

$$p_x = \frac{[c\,c.2]}{[c\,c.1]_a}\cdot\frac{[b\,b.1]}{[b\,b]}[a\,a],$$

in which

$$[c\,c.1]_a = [c\,c] - \frac{[b\,c]}{[b\,b]}[b\,c].$$

The probable error of a single observation (of weight unity) is

$$r = \pm 0.6745\sqrt{\frac{[v\,v]}{n-3}},$$

and the probable errors of x, y and z are

$$r_x = \frac{r}{\sqrt{p_x}}, \quad r_y = \frac{r}{\sqrt{p_y}}, \quad r_z = \frac{r}{\sqrt{p_z}}$$

If the observations are of unequal weights multiply the observation equations through by the square roots of their respective weights, and proceed as before.

CONSTANTS.

Mathematical and Astronomical Constants.

		log.
Base of natural logarithms	$\varepsilon = 2.71828183$	0.43429448
Modulus of common logarithms	$\mu = 0.43429448$	9.63778431
Radius of a circle in degrees	$r = 57.29578$	1.75812263
" " " " minutes	$r = 3437.7468$	3.53627388
" " " " seconds	$r = 206264.806$	5.31442513
Circumference of a circle in degrees	$c = 360$	2.55630250
" " " " minutes	$c = 21600$	4.33445375
" " " " seconds	$c = 1296000$	6.11260500
Sine of one second	0.000004848137	4.68557487
	$\pi = 3.14159265$	0.49714987
	$\frac{1}{\pi} = 0.31830989$	9.50285013
	$\pi^2 = 9.86960440$	0.99429975
	$\sqrt{\pi} = 1.77245385$	0.24857494
	$\sqrt[3]{\frac{\pi}{6}} = 0.80599598$	9.90633287
Mean solar days in a Julian year	365.25	2.5625902
" " " " sidereal "	365.25637	2.5625978
" " " " tropical "	365.24222	2.5625809
" " " " sidereal day	0.99726957	9.9988126
Sidereal " " mean solar day	1.00273791	0.0011874
Number of seconds in a day	86400	4.9365137
" " " " sidereal year	31558150	7.4991115
Square root of the attractive force of the sun (Gauss)	$k = 0.01720210$	8.2355814
" " " " " " " in sec's	$k = 3548.18761$	3.5500066
Time required for light to traverse the distance from the earth to the sun	498".57	2.6977261
Equatorial horizontal parallax	8".80	0.9444827
Aberration constant	20".52	1.3121774

Nutation constant, according to Peters . . . . . 9".2236 + 0".000009 (t—1850).

General precession, according to Struve . . . . . 50".2524 + 0".0002268 (t—1850).

Precession constants for the equator, according to Struve and Peters, (tropical year,)
$m = 46".0765 + 0".0002849\ (t-1850)$
$n = 20".0564 - 0".0000863\ (t-1850)$.

Obliquity of the ecliptic, according to Struve . . . .

$23^\circ\ 27'\ 30".76 - 0".4738\ (t-1850) - 0".0000014\ (t-1850)^2$.

Comparison of Linear Measures

		log.
1 English inch	0.02539977 metres	8.4048298
1 " foot	0.30479727 "	9.4840111
1 " yard	0.91439180 "	9.9611323
1 metre	3.28086933 English feet	0.5159889
1 centimetre	*0.39370432 " inches	9.5951702
1 toise = 6 Paris feet	1.94903631 metres	0.2898199
1 Paris foot = 12 Paris inches	0.32483938 "	9.5116687
1 Paris inch = 12 Paris lines	0.02706995 "	8.4324874
1 Paris line	0.00225583 '	7.3533062

* From Clarke's Comparison of 1866.

Dimensions of the Earth according to Bessel.

		log.
Equatorial semi-axis	a = 20923597. feet	7.3206363
	3962.8025 miles	3.5980024
	6377397.15 metres	6.8046435
Polar semi-axis	b = 20853654. feet	7.3191822
	3949.5557 miles	3.5965482
	6356078.96 metres	6.8031893
Compression . . .	$p = \frac{a-b}{a} = \frac{1}{299.1528}$ = 0.003342773	7.5241069
Eccentricity	e = 0.08169683	8.9122052
Quadrant of a meridian	Q = 10000855.76 metres	7.0000372

*Dimensions of the Earth according to Clarke (1866).**

		log.
Equatorial semi-axis	a = 20926062. feet	7.3206875
	3963.3 miles	3.5980536
Polar semi-axis	b = 20855121. feet	7.3192127
	3949.8 miles	3.5965788
Compression	$p = \frac{1}{294.9784}$ = 0.003390079	7.5302098
Eccentricity	e = 0.08227189	8.9152515
Circumference of Equator	= 24901.96 miles	4.3962335
Perimeter of meridian ellipse	= 24859.76 "	4.3954969
Area of the Earth's surface	= 196940400 square miles.	

*Constants for Conversion of English Weights and Measures to Metric, and vice versa.**

LINEAR.

1 inch = 2.54001 centimetres.	1 centimetre = 0.393700 inches.
1 foot = 0.304801 metres.	1 metre = 3.28083 feet.
1 yard = 0.914402 "	1 " = 1.09361 yards.
1 mile = 1.60935 kilometres.	1 kilometre = 0.62137 miles.

1 nautical mile = 6080.27 feet = 1.1516 statute miles = 1.85325 kilometres.

SQUARE.

1 square inch = 6.4516 square centimetres.	1 square centimetre = 0.15500 square inches.
1 square foot = 0.0929 square metres.	1 square metre = 10.7639 square feet.
1 square yard = 0.8361 " "	1 " " = 1.196 square yards.
1 square mile 2.5900 square kilometres.	1 square kilometre = 0.3861 square miles.
1 acre = 0.4047 hectares.	1 hectare = 2.4710 acres.
1 square mile = 259.008 "	1 square mile = 640 acres.

CUBIC.

1 cubic inch = 16.3872 cubic centimetres.	1 cubic centimetre = 0.06102 cubic inches.
1 cubic foot = 0.02832 cubic metres.	1 cubic metre = 35.3145 cubic feet.
1 cubic yard = 0.76456 " "	1 " " = 1.3079 cubic yards.

CAPACITY.

1 fluid dram = 3.70 cubic centimetres.	1 cubic cm. = 0.27 fluid drams.
1 fluid ounce = 29.57 " "	1 " = 0.0338 fluid ounces.
1 quart (U. S.) = 0.94636 litres.	1 litre = 1.0567 quarts (U. S.).
1 gallon (U. S.) = 3.78543 "	1 " = 0.26417 gallons (U. S.).
1 bushel (U. S.) = 0.35239 hectolitres.	1 hectolitre = 2.8377 bushels (U. S.).
1 gallon (British) = 4.54683 litres.	1 litre = 0.21993 gallons (British).
1 bushel (British) = 0.36348 hectolitres.	1 hectolitre = 2.75121 bushels (British).

* Adopted by the U.S. Coast and Geodetic Survey.

1 Imperial gallon (British), (1890) = 277.463 cubic inches.
1 gallon (U. S.) = 231. " "
1 bushel (U. S.) = 2150.42 " "

WEIGHT.

1 grain	= 0.0647989 grammes.	1 gramme	= 15.4324 grains.
1 oz. avoir.	= 28.3495 "	1 kilogramme	= 35.2739 oz. avoir.
1 lb. " (= 7000 grs.)	= 0.45359 kilog.	1 "	= 2.20462 lbs. "
1 oz. Troy	= 31.10348 grammes.	1 "	= 32.1507 oz. Troy.
1 lb. " (= 5760 grs.)	= 0.37324 kilog.	1 "	= 2.6792 lbs. "
1 ton of 2000 lbs.	= 0.907186 tonnes.	1 tonne	= 1.10231 tons of 2000 lbs.
1 " 2240 "	= 1.01605 "	1 "	= 0.98421 " 2240 lbs.

VELOCITY.

1 foot per sec. = 0.6818 miles per hour = 1.0973 kilometres per hour.
1.4667 feet " = 1 mile " = 1.6093 " "
0.9113 " " = 0.6214 miles " = 1 kilometre "
1 metre per second = 2.2369 miles per hour.

FORCE. ($g = 981$ cm.)

Weight of 1 gramme = 981 dynes. 1 dyne = weight of 0.001019 grammes.
" 1 grain = 63.57 " 1 " = " 0.01573 grains.
1 poundal = 13825.5 " 1 " $= 7.2330 \times 10^{-5}$ poundals.

STRESS.

1 lb. per sq. inch = 70.307 gms. per sq. cm. 1 gm. per sq. cm. = 0.01422 lbs. per sq. in.
1 " " foot = 4.8824 kg. " " 1 kg " m. = 0.20482 " " ft.
1 standard atmosphere = 1033 gms. per sq. cm. = 14.7 lbs. per sq. in.

WORK.

1 foot-poundal = 421403 ergs. 1 erg $= 2.3730 \times 10^{-6}$ foot-poundals.
1 jonle $= 10^7$ " 1 megalerg $= 10^6$ ergs.
1 foot-pound ($g = 981$ cm.) $= 1356.3 \times 10^4$ ergs $= 0.138255$ kilogramme-metres.
1 kilogramme-metre ($g = 981$ cm.) $= 981 \times 10^5$ ergs $= 7.2330$ foot-pounds.

RATE OF DOING WORK.

1 horse-power = 746 watts = 1.01387 force de cheval.
1 force de cheval = $735\frac{3}{4}$ " = 0.98632 horse-power.
1 horse-power = 33000 foot-pounds per minute ($g = 981$ cm.)
1 watt = 44.2385 " " "
1 force de cheval = 75 kilogramme-metres per second "

PHYSICAL CONSTANTS.

1 cu. inch of distilled water at 4° C. weighs 252.568 grains = 16.3662 grammes.
1 " " " 62° F. " 252.286 " = 16.3479 "
1 cu. foot " " 62° F. " 62.2786 lbs. avoir.
1 " of dry air 32° F., pressure 760 mm., weighs 565.1 grains.
1 litre " " 0° C., " " " 1.29305 grammes.

Accelleration of gravity at the sea level for the latitude ϕ (Harkness),
in feet per sec., $g = 32.086528 + 0.171293 \sin^2 \phi$;
in metres per sec., $g = 9.779886 + 0.052210 \sin^2 \phi$.

Value of g at equator = 9.7799 m. per sec.; at poles = 9.8321; at Greenwich = 9.8117; at Paris = 9.8094; at Washington = 9.8007.

Length of seconds pendulum at sea level for latitude ϕ (Harkness),
$l = 39.012540 + 0.208268 \sin^2 \phi$ inches $= 0.990910 + 0.005290 \sin^2 \phi$ metres.

Velocity of light in vacuum, according to Newcomb,
186326 miles per second = 299860 km. per second.

Velocity of sound in dry air $= 1090 \sqrt{1 + 0.00367\, t}$° C. feet per second.